

ISSUE: JANUARY

VOL 10

2022

CREATORS

NEWSLETTER of BIONEST-IASST

In association with ISVEC

Editor's Desk

Greetings of the new year to all the well-wishers!!

With full confidence and positivity amidst the uncertainty that is lingering with respect to corona pandemic around us, I bring the first issue of newsletter of the year 2022 and the 10th volume of our periodic newsletter "Creators".

The 10th volume of Creators is a compilation of events and workshops conducted at IASST, novel intervention for improving tea crop productivity, Agribusiness & Food Processing Entrepreneurship in North East and a brief overview on getting Food safety and standards authority of India (FSSAI) license.

A synergy of people, process and innovation has enabled us to come with the current volume which has led us to a path of accelerated growth.

We thank all the Editorial Members and contributors for your support and cooperation in keeping the momentum of activities going.

Editor

Prof. Ashis Kr. Mukherjee

DIRECTOR-IASST, Ghy-35



Editorial Team:

Dr. Devasish Chowdhury, Dr. Tania P. Das, Mr. Sagar Kumar, Mr. Minku Das, Dr. Tarini D. Goswami, Mr. Nayan Talukdar

EVENTS AND WEBINARS

Invited talk by Prof. (Dr.) Pratap Jyoti Handique on 08-10-2021

Prof. (Dr.) Pratap Jyoti Handique, Hon'ble Vice Chancellor, Gauhati, University, delivered a talk on "Medicinal plant diversity of North East India: Conservation and Utilization" on 08-10-2021 at 3:00 pm via online mode for National Lecture Series in the occasion of National celebration of 75th year of India's Independence-"Azadi Ka Amrit Mahotsava".

Celebration of World Mental Health day on 10th October 2021

On the occasion of the "World Mental Health day", a talk was delivered by renowned psychiatrist Dr. Nahid Suraiya Islam from GNRC hospital, Guwahati on 10th October 2021 at 6 PM via virtual mode. The title of her talk was "Stress management in an institution." as a part of Celebration of 75th Year of India's Independence: "Azadi Ke Amrit Mahotsava".

Signing of MoU between IASST & Aaranyak

On 12 October 2021 IASST signed a Memorandum of Understanding (MoU) with the Aaranyak, a premier biodiversity conservation and research organization here at Guwahati for academic and research cooperation. The MoU was signed by Dr. Diganta Goswami, Registrar, IASST and Dr. Bibhab Kumar Talukdar, Secretary-General and the CEO of Aaranyak, in the presence of Prof. Ashis Kumar Mukherjee, Director, IASST. Prof. Mukherjee, said that this MoU would facilitate the joint working of various research divisions of both the institutes to undertake multidisciplinary scientific research, education & outreach as well as human resource development for biodiversity conservation and environmental protection in Northeast India. Director, IASST. Prof. Mukherjee, said that this MoU would facilitate the joint working of various research divisions of both the institutes to undertake multidisciplinary scientific research, education & outreach as well as human resource development for biodiversity conservation and environmental protection in Northeast India.



Celebration of Vigilance Awareness Week from 26th Oct to 1st November 2021

Celebration of Vigilance Awareness Week was conducted at IASST from 26th October 2021 to 1st November 2021 as a part of Celebration of 75th Year of India's Independence: "Azadi Ke

Amrit Mahotsava." At 11 am Integrity pledge was taken by students and employees along with Director, IASST near Chintan Chorah. In the evening at 3 pm Sri Joseph Krelo (Dy. S.P. CBI Guwahati delivered a talk for the students and staff of IASST.

43rd Foundation Day

IASST, Guwahati celebrated its 43rd Foundation Day on Wednesday, November 3, 2021. Prof. Ashis Kumar Mukherjee, Director, IASST inaugurated the programme. Madam Dorothy C Hodgkin Foundation day lecture was delivered by Prof. Dhrubajyoti Chattopadhyay, Vice-Chancellor, Sister Nivedita University, Kolkata and Sir C V Raman Foundation Day Lecture was delivered by Dr. Ganapati Narahari Sastry, Director, North East Institute of Science and Technology (NEIST), Jorhat, Assam. The event continued with felicitation of the Ph.D Degree recipients and Covid -19 Lab workers. It was followed by cultural programme and prize distribution ceremony for the co-curricular activities conducted at IASST campus.

Celebration of National Entrepreneurship Day on 9th November 2021

BioNest-IASST in association with ISVEC organized a webinar on the occasion of National Entrepreneur's Day which was held on 9th November 2021 from 3 PM onwards. IASST has been celebrating National Entrepreneur's Day since 2017. The Webinar commenced with the inaugural statement of the Honourable Director-IASST, Prof. Ashis Kr. Mukherjee who have motivated the researchers and attendees to augment the spirit of agripreneurship. The invited speaker of the event was Mr. Subhas Bhattacharjee, Former Managing Director, NERAMAC Ltd, Ministry of DoNER, Govt of India, Guwahati. The topic of his talk was "Agribusiness and Food Processing Entrepreneurship in north east". Mr. Bhattacharjee was successful in spreading awareness about advanced food processing technologies and focused on various avenues of entrepreneurship avenues in Agribusiness and food processing.

Celebration of World Diabetes Day on 14th November, 2021

Professor Uma Kaimal Saikia, Professor and Head, Department of Endocrinology, Gauhati Medical College, Assam delivered a talk on “Diabetes Mellitus- the way forward” at 3:30 pm via online mode on the occasion of World Diabetes Day on 14th November, 2021.

In-house talk by Dr. Debajit Thakur on 24th November 2021

In-house talk by Dr. Debajit Thakur, Assoc. Prof. – II, Biodiversity and Ecosystem Research (LSD) on 24th November 2021 at 2:45 pm in online mode for the lecture series “Talks by Scientists at AI” in the occasion of National celebration of 75th year of India’s Independence-“Azadi Ka Amrit Mahotsav” Title of talk:- “Tea (Camellia sinensis)-Microbe Interactions: Insights into the functional characteristics of Tea associated microorganisms.”

Observation of Constitution Day on 26th November 2021

Institute of Advanced Study in Science and Technology, Guwahati, observed Constitution Day on 26th November 2021 with full enthusiasm to commemorate India’s adoption of the Constitution. Director Prof. Ashis Mukherjee, Registrar, faculty members, staff, and all the students read the Preamble of the Constitution along with the Hon’ble President of India.

Visit to IASST by Padma Bhushan Dr. T. Ramasami- former Secretary DST

Prof. T. Ramasami, former Secretary, Department of Science and Technology, former chairman, Governing Council of IASST, and recipient of highest civilian award Padma Bhushan, visited IASST on November 27, 2021. He was accompanied by Dr. G. Narahari Sastry, Director, CSIR-NEIST, Jorhat. Prof. Ramaswamy and Prof. Sastry were welcomed by Prof. Ashis K. Mukherjee, Director, other scientists, staff and students of IASST. On this occasion, a fruit plant was planted by Prof. Ramaswami, and he also interacted with the faculties and students of IASST. The topic of discussion –“growth and development of science and technology in NE India”. The Director and scientists of IASST express their gratitude for his remarkable contribution and initiatives for shaping the research activities of IASST and including it as one of the autonomous research Institutes of DST, Ministry of Science and Technology, Govt. of India.



Celebration of “World Soil Day” on 5th December 2021

As part of National celebration of 75th year of India’s Independence- “Azadi Ka Amrit Mahotsava”, World Soil day was conducted where Dr. Manmohanjit Singh delivered a talk on Soil physical Quantity vis-à-vis soil erosion under changing climate scenario via online mode.

Awareness Programme on Sexual Harassment of Women at Workplace

IASST organized an Awareness Programme on Sexual Harassment of Women at Workplace at 3 PM on 9th December, 2021 as part of National celebration of 75th year of India’s Independence- “Azadi Ka Amrit Mahotsav. A talk was delivered by Prof Polly Vauquiline (HOD, Dept of Women Studies, Gauhati University)

Invited talk by Mr. Pranjal Baruah held on 17th December 2021

A talk by Mr. Pranjal Baruah, Ashoka fellow and Founder of Mushroom Development Foundation was organized on the topic- “Industrialization of mushroom cultivation.” on 17/12/2021 at 3.00 PM in hybrid mode (offline and online)

In-house talk by Dr. Sarathi Kundu on 21st December 2021

For the lecture series “Talks by Scientists at AI” in the occasion of National celebration of 75th year of India’s Independence-“Azadi Ka Amrit Mahotsav” an In-house talk by Dr. Sarathi Kundu, Assoc. Prof. - II, Advanced Material Sciences (PSD) was organized on 21st December 2021 at 2:45 pm in online mode. He delivered a talk on -Collapsed Structures of Organic Thin Films.

Possibility of Reducing Chemical Inputs in Tea (*Camellia Sinensis*) Production through the Intervention of Microbial Inputs

Dr. Debajit Thakur
Microbial Biotechnology Laboratory
Life sciences Division, IASST, Guwahati-35

Tea [*Camellia sinensis* (L.) O. Kuntze] is an economically important caffeine-containing beverage crop with massive plantation in the Northeast corner of the agro-climatic belt of India. The major tea growing areas in India are Assam, Darjeeling, the Nilgiri and other places in South India. India is one of the largest producers, consumers and exporters of tea and thus plays an indispensable part in the Indian economy [1]. Tea plants are perennials and are mostly grown in a warm and humid climate, and their unique cultivation condition makes them more disease prone [2]. The Tea plantations of NE India offer congenial environment, rendering tea crop susceptible to various fungal diseases like blister blight, black rot, branch canker, red rust, root/collar rot etc. necessitating judicious use of chemicals. Extensive use of chemicals such as fertilizers, fungicides and pesticides in tea fields for a prolonged period of time deteriorated the tea production and also reduced the soil fertility [3]. In the recent years, due to higher demand of chemical residue free made tea by the importing countries has led to a decline in the export of tea. Therefore, there is a need for eco-friendly alternative approach which can reduce the use of chemical application. Microbial plant growth promotion and microbial biological control has drawn attention and has been considered as a potential alternative to chemicals inputs [4].

Plant associated microorganisms may contribute to plant growth and defense by direct or indirect methods.

A broad range of microbial population inhabits the plant exterior (rhizosphere and phyllosphere) as well as plant interior (endosphere). We are focusing on the application and functioning of indigenous rhizosphere associated beneficial microflora and endophytic microbial community prevalent in commercial crop like Tea for plant growth promotion and disease suppression for sustainable crop production [5-11]. Much of our current work is focused on understanding the fungal pathogens of Tea, molecular diagnosis, mode of infections and biological control [12, 13]. In our continued search for the novel microbial metabolites having agricultural potential, a large number of actinobacteria were isolated from commercial Tea rhizosphere soil samples and screened for the extracellular antifungal metabolites production.

This has resulted in isolation of a mesophilic actinobacterial strain designated as TT-3, isolated from Tea rhizosphere soil sample. Based on phenotypic and molecular characteristics, the strain was identified as *Streptomyces* sp. (GenBank accession no. KT892738). *Streptomyces* sp. TT3 showed promising plant growth promoting activity such as production of IAA, siderophore, and ammonia along with phosphate solubilization which are important traits for the plant growth. The *Streptomyces* sp. TT3 exhibited potential antagonistic activity against the tested

pathogens (Figure 1). Further, ethyl acetate extract of TT3 (EA-TT3) consisting of a mixture of metabolites significantly suppressed the growth of fungal

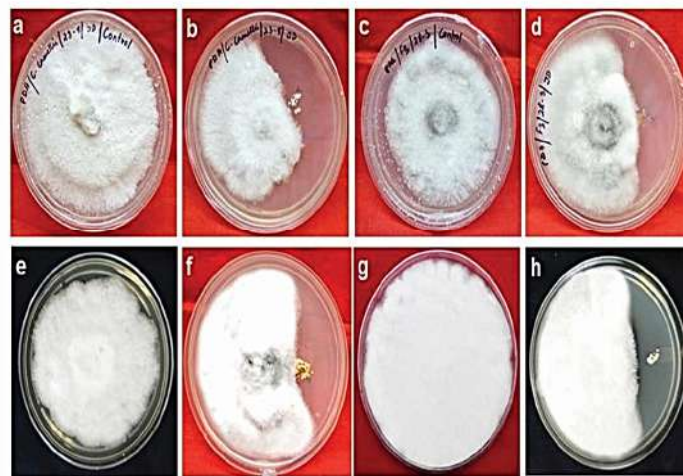


Figure 1: Antagonistic activity of *Streptomyces* sp. TT3 against Tea fungal pathogens by spot inoculation method. (a) control plate of *R. solani*, (b) test plate of *R. solani*, (c) control plate of *N. sphaerica*, (d) test plate of *N. sphaerica*, (e) control plate of *F. oxysporum*, (f) test plate of *F. oxysporum*, (g) control plate of *P. theae*, (h) test plate of *P. theae*.

To detect the potential volatile compounds in *Streptomyces* sp. TT3, we have performed the GC-MS analysis of EA-TT3. Five most significant compounds were detected in the EA-TT3 crude extract with different retention time and abundance. Thus, we assume that these compounds could be the key contributing factor for the antifungal activities of

EA-TT3. From our study, it is indicated that this tea rhizosphere-derived *Streptomyces* sp. TT3 has the potential to consider as antifungal and PGP metabolites producing strain and this strain could be safely and efficiently used as an alternative to chemical inputs for fungal diseases suppression and growth promotion in tea field. The above mentioned work is published in *Current Microbiology*, 2020, 77,1829-1838.

A liquid antifungal product has been developed using the *Streptomyces* sp. TT-3 and validated in commercial Tea Estates of Assam for the application against major foliar tea fungal diseases and growth promotion in commercial Tea plantation. The product is found to be very effective in control of fungal diseases Fusarium Dieback, Black Rot (causal agent, *Corticium* sp.); Red Rust (causal agent, *Cephaleuros* sp. in both stem and leaf) and Mealy-Bud in commercial Tea Estates. Optimization of cultural conditions and a mass scale production process for the strain *Streptomyces* sp. TT-3 was developed.

The technology for the production of growth promoting and antifungal metabolites by the strain is transferred to M/S Green Harvest (India) Bio-Tech Pvt. Ltd., Guwahati. The work assumes significance in view of the fact and increased realization amongst government agencies, environmentalists and end users that microbial biocontrol agents are to be used progressively to reduce application of chemical inputs which could be beneficial for the tea plantation of NE India.



A snapshot of the product

References:

1. Majumder AB, Bera B, Rajan A. Tea Statistics: Global Scenario. *Inc J Tea Sci*. 2010; 8:121-124.
2. Baby UI. An overview of blister blight disease of tea and its control. *J Plantation Crops*. 2002; 30:1-12.
3. Chakraborty U, Chakraborty BN, Chakraborty AP, Sunar K, Dey PL. Plant growth promoting rhizobacteria mediated improvement of health status of tea plants. *Indian J Biotechnol*. 2013; 12:20-31.
4. Goldman GH, Hayes C, Harman GE. Molecular and cellular biology of biocontrol *Trichoderma* spp. *Trends Biotech*. 1994; 12:478-482.
5. Hazarika N, Saikia K, Borah A, Thakur D. Prospecting endophytic bacteria endowed with plant growth promoting potential isolated from *Camellia sinensis*. *Frontiers in Microbiol*. 2021; 12: 2648.
6. Dutta J, Thakur D. Diversity of culturable bacteria endowed with antifungal metabolites biosynthetic characteristics associated with tea rhizosphere soil of Assam, India. *BMC Microbiol*. 2021; 21: 216.
7. Dutta J, Thakur D. Evaluation of antagonistic and plant growth promoting potential of *Streptomyces* sp. TT3 isolated from Tea (*Camellia sinensis*) rhizosphere soil. *Cur. Microbiol*. 2020; 77, 1829-1838.
8. Borah A, Thakur D. Phylogenetic and functional characterization of culturable endophytic actinobacteria associated with *Camellia* spp. for growth promotion in commercial tea cultivars. *Frontiers in Microbiol*. 2020; 11:318.
9. Borah A, Das R, Mazumdar R, Thakur D. Culturable endophytic bacteria of *Camellia* species endowed with plant growth promoting characteristics. *J. Appl. Microbiol*. 2019; 127: 825-844.
10. Dutta J, D. Thakur. Evaluation of multifarious plant growth promoting traits, antagonistic potential and phylogenetic affiliation of rhizobacteria associated with commercial tea plants grown in Darjeeling, India. *PLoS one*. 2017; 12(8): e0182302.
11. Dutta, J, Handique PJ, Thakur D. Assessment of culturable tea rhizobacteria isolated from tea estates of Assam, India for growth promotion in commercial tea cultivars. *Front. in Microbiol*. 2015; 6: 1252.
12. Barman A, Nath A, Thakur D. Identification and characterization of fungi associated with blister blight lesions of tea (*Camellia sinensis* L. Kuntze) isolated from Meghalaya, India. *Microbiol. Research*. 2020; 240: 126561.
13. Dutta J, Gupta S, Handique PJ, Thakur D. First report of *Nigrospora* leaf blight on Tea caused by *Nigrospora sphaerica* in India. *Plant Disease*. 215; 99: 417.

Agribusiness & Food Processing Entrepreneurship in North East

Mr. Subhas Bhattacharjee
(Former Director NERAMAC)

North Eastern States are small and are in the developing stages which have a long way to go in economic development and trade. Region contributes three per cent of India's gross domestic product. Barely one per cent of the region's agri-output is exported, with a lack of infrastructure for long-term storage. These states have factor endowments and skills which are quite amenable to trade and be further developed and promoted for the purpose of exports and create an international /ASEAN trade image of north east. While the prospects of NE-ASEAN trade are good, the problem to develop them is also quite formidable. Agribusiness and Food Processing has emerged as a high growth, high profit sector. The vast availability of natural raw material, favourable policy matters and numerous economic incentives & benefits offered by the Central Government have made India and even north east an attractive destination for investment in agro & food processing.

Though the sector has huge potential, it is somehow unfortunate that it has remained relatively under developed, due to which enormous quantities of valued farm produces worth INR 95000 Cr are wasted annually. In order to arrest this colossal national loss, application of improved modern technology to develop integrated food supply chain from farm to the fork of the consumer is of utmost importance for both the north east & the country as a whole.

NE region has a quantum of marketable surplus in a number of perishable commodities which are rated as Immune boosters. A dedicated marketing and visibility campaign for products from the NER needs to be implemented, which will help in increasing the awareness in target customer segments. These could range from large to small enterprises / start-ups or directly to customers. Further, the agricultural and horticultural produce value chains in the NER are marred by several challenges such as inadequacy of infrastructure, unavailability of processing industries, production and aggregation issues, etc.

Being the hub of organic & exotic agro-horticultural produces, spices & herbs; north east offers basket full of opportunities for the unusual. With its proximity to south East Asian markets, being home to diverse & exotic variety of fruits & spices, region can be major Centre of agribusiness & can command a high price in domestic & export market. Many of these produces are having GI tag, thus triggering huge possibilities for branded marketing.

In the north east, large losses from farm to plate are mainly attributed to poor handling, distribution, storage, and proper packaging. Valued

resources that could otherwise be spent on more productive activities go into producing & transporting goods that only go to waste for the want of appropriate primary or secondary processing /packaging. Losses at every stage of the food chain can be reduced by using appropriate processing & packaging. It is estimated that more than 40% of fresh produces are wasted due to various reasons in the region resulting in loss of nutritional value. Monetary loss on that count is also very high. Appropriate processing, packaging with proper branding, labelling and publicity can pave the way to a great extent. Training & skill development on packaging can facilitate the first generation entrepreneurs of north east in making a dent in marketing of exotic produces.

Agro-horticulture potential of north east has not been tapped, mainly due to lack of market led production practices, poor commercial understanding of farmers, insufficient infrastructure at the farm level, poor transportation system, inadequate road network, pack houses, cold storages, sorting grading lines, processing industries etc. Time bound agro-horticultural projects (vocal for local) through entrepreneurs and its marketing/branding can truly transform this goldmine region into a vibrant hub of horticulture business & trade.

Initiatives of Government of India to promote horticulture development, appropriate strategies like adoption of market driven production system, enhancement of productivity, appropriate post-harvest handling through proper packaging, loading/unloading of commodities and promotion of pack house concept including collection center in the production clusters, cold storage, processing and value addition, creation of adequate transportation

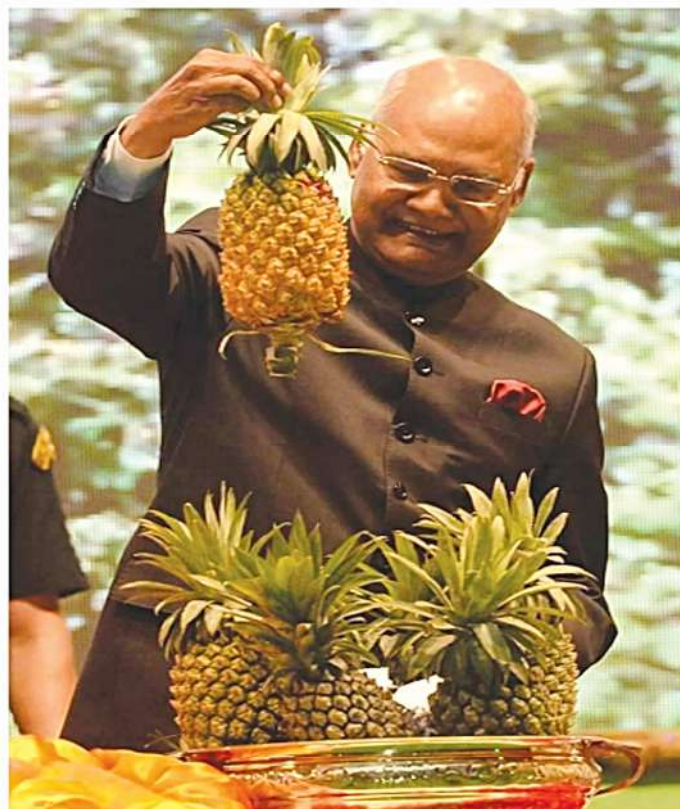
infrastructure and organized marketing system are necessary additions to current interventions to provide remunerative prices to farmers.

Fruit and Vegetable processing industry offers enormous possibilities to be the mainstay of the economic development so as to directly benefit the farmers and prevent the wastage of the valuable farm produces, create enough direct and indirect employment opportunities for the rural youth. The emphasis of the Govt of India to introduce intensive cultivation of fruits & vegetables over higher land acreage and enhancing the productivity, with the proactive involvement of the agencies like Mission for Integrated Development of Horticulture (MIDH) and the Mission for Organic Value Chain Development for North East Region (MOVCD-NER), is going to bolster the sector. Processing, preservation and value addition of produces is going to generate additional income of the farmers as well as the FBOs (Food Business Operators) including the first-generation entrepreneurs and the intermediaries as well as the unemployed youth leading to the overall development. Entrepreneur can take advantage of this situation thereby supporting his/her own sustainability and also in turn support farmers/producers who otherwise are in a cornered situation due to unavailability of suitable and immediate food preservation systems.

Influence of Natural & Organic foods' of north east on consumption pattern across urban Centre & elite groups are already in existence for long. Hence, most important is to reduce the post-harvest losses with their on-farm and near farm cluster processing solutions suitable for Farmers producers Organisations (FPO), Farmers Producers Companies (FPC) and also large individual farmers of the north east. These sustainable processing & packaging can gear up domestic and export market further and bring a win-win-situation for farmers/producers as well as entrepreneurs of the region. Besides, a plethora of expertise under different Mission and Incubation Centre with innovative hand holding approach can utilise the naturally available resources of north east significantly.

Considering the difficult terrain and the logistic issues, it is always preferred to set up facilities for value addition and processing in MSME sector only.

One should initiate and facilitate linking the up-coming units with established PAN India brands in the market such that the initial stress of marketing of the products directly can well be avoided. Marketing through the established brands will support the processing units in bringing up sustainability. However, there is an ample scope to self-sustaining in the agro-horti sector in the region considering the potential horticultural produces available in north east states.



Hon'ble President of India with
GI tagged Queen Pineapple of Tripura



Cashew Nuts of North East –
A Lip smacking Snacks

Food Safety Compliance System (FoSCoS) is an enhanced version of Food Licensing and Registration System (FLRS) which was launched in 2012 for issuance of pan-India FSSAI Licenses and Registration. FoSCoS is built with a vision to have modern one stop pan-India IT platform for food safety regulatory needs which is integrated with FSSAI's other existing IT platforms such as Food Safety Compliance through Regular Inspection and Sampling (FoSCoRIS), Food Safety Connect-Complaints Management System, Online Annual Return platform, Food Import Clearing System (FICS), Indian Food Laboratory Network (InFoLNet), Food Safety Training and Certification (FoSTaC), Food Safety Mitra (FSM) etc.



Key points

- ★ Petty food business operators (FBOs) are small business etc. who are encouraged to apply for registrations.
- ★ One FBO's premise shall have only one FSSAI License or registration on which any number of kind of businesses (KoB) can be added
 - ★ Three types of modifications allowed i.e. Form-C (Chargeable at INR 1000), Non Form-C and Selection of Standardized products by existing manufacturing licensee.



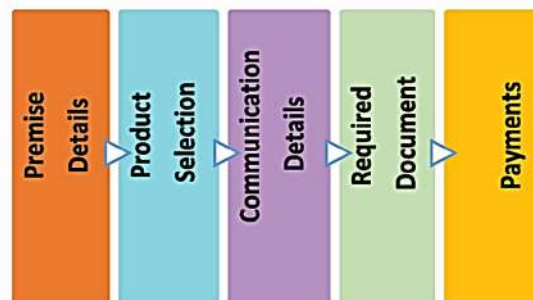
FSSAI Registration Fees:

FSSAI Basic Registration (Turnover less than Rs.12 lakh p.a) – Fee of Rs.100

FSSAI State License (Turnover more than Rs.12 lakh p.a and less than Rs.20 crore p.a)– Fee between Rs.2,500 to Rs.5,000

FSSAI Central License (Turnover of more than Rs.20 crore p.a)– Fee of Rs.7,500

Steps of Application:



Renewal of FSSAI License

The FSSAI license is essential to commence the food business, similarly, it is imperative to renew the license. The license is issued for a validity of 1 year or 5 years, so the business must apply for renewal 30 days prior to the expiry of the current license.

Penalty for Non- Compliance

Sl.No	Particulars	Fine
1	Food quality not in compliance with act	2 Lakh
2	Sub-standard food	5 Lakh
3	Misbranded Food	3 Lakh
4	Misleading advertisement or false description	10 Lakh
5	Extraneous matter in food	1 Lakh
6	Failure to comply with Food safety officer direction	2 Lakh
7	Unhygienic processing or manufacture	1 Lakh

For more details: <https://foscoss.fssai.gov.in/>