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**Days of  
FARMERS PROTEST**

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# AGRICULTURE UPDATE

## Ministry of Agriculture and Farmers Welfare signs MoU with **Central Silk Board**



The Ministry of Agriculture and Farmers Welfare today signed a Memorandum of Understanding (MoU) with the **Central Silk Board** under the **Ministry of Textiles** on a convergence model for the implementation of Agroforestry in the silk sector under the ongoing Sub-Mission on Agroforestry (SMAF) Scheme.

The MoU was signed by **Dr. Alka Bhargava**, Additional Secretary, DAC&FW and Shri **Rajit Ranjan Okhandiar**, Member Secretary (Central Silk Board), Ministry of Textiles in the presence of Union Minister of State for Agriculture and Farmers Welfare Shri **Parshottam Rupala** and Union Minister for Textiles **Smt. Smriti Zubin Irani** and other dignitaries.



## Cabinet approves MoU between **India** and **Fiji** for cooperation in the field of Agriculture and Allied Sectors



The **Union Cabinet** chaired by the **Prime Minister**, Shri Narendra Modi has approved the signing of a Memorandum of Understanding (MoU) between the Ministry of Agriculture and Farmer's Welfare of the Republic of India and Ministry of Agriculture of the Republic of Fiji for cooperation in the field of Agriculture and Allied Sectors.

Under the MoU, a **Joint Working Group (JWG)** will be constituted to set down procedures and plan and recommend programs of cooperation towards achieving its aims through the Executing agencies of the two countries. The JWG will hold its meeting alternately in India and Fiji once in every two year.



## Hyderabad Farmer Innovates Farming Technique for Vitamin D-Enriched Wheat and Rice, Wins Patent



Padma Shri-winning Hyderabad farmer **Chintala Venkat Reddy** has formulated a method to naturally fortified rice and wheat with **vitamin D**. Studies have shown that about **70-90%** Indians are low on this nutrient. When Reddy discovered this is a rampant problem, he wished to come up with a natural way to enrich the body with the vitamin rather than relying on medicines.

On **February, 11 2021**, the 70-year-old farmer won a patent for **vitamin D-enriched rice and wheat** from the **World Intellectual Property Organization (WIPO)**, Geneva. I succeeded after working on it for two years. Then filed for a national patent in August 2019 and a year later, I applied for International patent on August 1, 2020.





## Union Agri Minister awards **five states** for effective implementation of PM- KISAN scheme



On the **second anniversary** of the PM-Kisan scheme Union Agriculture Minister Narendra Singh Tomar awarded the best performing states for exemplary work in implementing the scheme.

For the highest percentage of Aadhaar authenticated beneficiaries, **Karnataka** has topped the chart with **97 per cent** of beneficiaries.

**Maharashtra** has received the award for **good performance** in physical verification and grievance redressal under the scheme.

**Uttar Pradesh** was awarded for the **fastest implementation** of the scheme in the state. As far as **North East and Hilly Terrain** states are concerned, **Arunachal Pradesh** became the state with the highest percentage of **Aadhaar verification** with **98 %** of beneficiaries being verified. **Himachal Pradesh** also received the award for **good performance** in physical verification and grievance redressal.



## **Rajasthan** to introduce separate agriculture budget from next year



During the Rajasthan Budget Session 2021-22, **Chief Minister Ashok Gehlot** announced that a separate agriculture budget will be presented from next year.

Our government has also remained friendly with farmers and has been introducing measures regarding relief from agricultural debt. On the three controversial central agriculture laws, keeping the interests of the farmers in mind, we have passed three bills in the last Assembly session and forwarded it to the Governor for approval of the President. Taking forward this feeling, I propose to start the agricultural budget from next year for better future of the food providers and to protect their interests



## National Bamboo Mission organized a National Conference on Opportunities and Challenges for Bamboo in India



The National Bamboo Mission anchored at the Department of Agriculture Cooperation & Farmers Welfare organized a **two day conference ‘National Consultation on Opportunities and Challenges for Bamboo in India’** through the virtual platform on **25<sup>th</sup> and 26<sup>th</sup> of February 2021**. NITI Aayog and Invest India also joined hands with the National Bamboo Mission to conduct the event. The aim of the brainstorming session was to deliberate on the bamboo ecosystem for promoting the holistic growth of the sector across the entire value chain.



## Karnataka to set up a Flower Processing Centre



The **Karnataka State Horticulture Department** is setting up a “Flower Processing Centre”, in collaboration with the **International Flower Auction Bangalore (IFAB)**, to convert unsold flowers into various useful products. The facility will provide support to the flower farmers who suffer huge losses whenever there is a glut or market disruption. Growers can learn the art of flower processing from the centre. The incubation centre will process flowers and convert them to value-added products such as natural dyes, floral papers, incense sticks, flower petal powder for cosmetic usage, floral embedded works, floral arts, and silica-stored flowers.



COVER STORY



# 100

## Days of Farmers Protest

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*The historic farmers' struggle at Delhi's doorsteps and elsewhere in the country has completed more than 100 days from the time Samyukt Kisan Morcha launched it. It is turning out to be the largest and longest peaceful citizens' protest anywhere in the world. As days stretch into months, there is often a certain impatience and frustration that one encounters from the public and even the media about the 'lack of a breakthrough'. A farmer sows seeds at the beginning of a farming season with a great deal of hope, and then waits for several months before s/he can harvest. A full grown crop sometimes get destroyed because of a natural disaster at the time of harvest. However, the farmer does not lose hope.*

### ***Need of farm laws: -***

These are some of the steps taken by the ruling NDA government to double the income of farmers. Lately in 2019 with the guidance of the Committee on Agriculture (2018–19) suggested several welfare and reforms in favor of farmers and most importantly Indian agricultural markets.

### ***What do these laws say: -***

The laws loosen rules around the sale, pricing, and storage of farm produce which have protected India's farmers from the free market for decades. But these reforms are badly implemented in some states. Thus, damaging Indian agriculture market reforms, and removing stock selling limits to some of the important products.





### **Government response: -**

20 September 2020, Prime Minister Narendra Modi referred to the bills as a watershed moment in the history of Indian agriculture and stated the bills will "ensure a complete transformation of the agriculture sector" and empower millions of farmers.

### **Misconceptions about the reforms:**

The acts have faced protests from farmers in various parts of India basically in Punjab and Haryana that it will hurt their earnings. Controversy roundabout removal of MSP with time and thus and weaken their bargaining power, leaving them vulnerable to exploitation by private companies are

the main cause farmers are protesting. But critics of the government say it failed to consult farmers before passing the laws.

### **Black flags, tractors, slogans mark 100-day protest-**

farmers raised black flags, wore black armbands and some women protesters with black 'dupattas' shouted slogans against the BJP-led government for not acceding to their demands. Protesters in Sonipat and Jhajjar districts and some other places brought their tractor-trolleys and other vehicles and parked them in the middle of the KMP Expressway in some stretches.





## Blockade at expressway

The farmers squatted on the roads and blocked the toll plazas at various points on the expressway from 11 am to 4 pm. However, they ended it half an hour before the scheduled time. Farmers held the protest at KMP Expressway near Mandothi village in Jhajjar district. Some people from nearby villages joined them

## Tractor March on 26 January

What exactly happened on 26 January is farmers protesting at Singhu, Tikri, and Ghazipur border points of New Delhi broke police barriers to march historic 400 years old red fort. Many of the farmers, who had adorned their tractors with colorful flags, including the flag of India and various farmers unions protesting there for months. Some of the protesters deviated from their pre-sanctioned routes permitted by Delhi Police and breached the barricade. However, a section of the tractor rally turned violent as the protesting farmers clashed with the police. Whereas

farmers have no objection certificate (NOC) from Delhi police for pre-planned tractor rally with 37 limit and conditions and fixed time slot. One of the protesters identified as Deep Sandhu having flawed contact with NDA unfurled the religious flag (Nishan Sahib) in the red fort. Thus, dishonoring the Indian Flag and secularism.

According to Delhi Police, 394 policemen and thousands of farmers were reported injured, 30 police vehicles were damaged. More than 300 barricades were broken, 17 govt. vehicles were destroyed.

Soon after the 26 January, violent protest farers canceled the 1 February Parliament march. Twitter suspended over 550 accounts related to farmer protest over the 26 January protest. The names of Darshan Pal, Yogendra Yadav, and 35 other farmer-leaders were



mentioned in the FIR registered at the Samaypur Badli Police Station. The FIR registered at the Ghazipur Police Station in East Delhi named Rakesh Tikait and other farmer-leaders for instigating protesters. Delhi police filed an FIR under the Unlawful Activities (Prevention) Act and sedition against 25 persons and farm leaders involved in the rioting. Over 200 protesters were detained by the police. Police filed criminal charges against eight journalists for allegedly misreporting the events of that day.

#### **International reactions: -**

The US issues security alerts to its embassies, consulates in India. The US has advised its personnel to avoid areas including the northern border of Delhi, areas along the Republic Day parade route, and downtown areas near the India Gate in light of the violence that erupted in the national capital on Tuesday. This advisory has been circulated to the US Embassy and Consulates in India.

#### **TIME magazine:-**

The TIME magazine has dedicated its international cover to the women farmer protesters in India. The TIME magazine has dedicated its international cover to the women who is leading the farmers' protest at Delhi's borders and has been camping for

months demanding rollback of the three contentious farm laws?

Women, who form the backbone of Indian agriculture, may be particularly vulnerable to corporate exploitation. According to Oxfam India, 85% of rural women work in agriculture, but only around 13% own any land. “Women are not seen as farmers. Their labor is immense but invisible,” says Jasbir Kaur Nat a member of the Punjab Kisan Union, who is mobilizing farmers in Tikri, the protest site at the border of Haryana and Delhi. It’s late February and Kaur has been camping at the Ghazipur protest site for over three months, only returning home once. She was stung by the court’s suggestion that women were mere care workers providing cooking and cleaning services at these sites—though she does do some of that work—rather than equal stakeholders. “Why should we go back? This is not just the men’s protest. We toil in the fields alongside the men. Who are we—if not farmers?” says Manbir Kaur, a sprightly 74-year-old farmer from Rampur in western Uttar Pradesh. “This law will kill us, will destroy what little we have,” says Amandeep Kaur, a farmer from Talwandi in Punjab, whose husband died by suicide five years ago, following a bad crop that landed him with a debt of around \$7,000.

All these stories are covered by TIME newspaper.





Time Newspaper taking advantage of this rare situation thus highlighting the gender gap and inequality in India all over the world.

“The *Times of India*, Mumbai’s largest circulating English daily, chose to run only a photograph of the rally but no story on its

front page.” In favor of farmers protest.

Time Newspaper plays an initiative role in reflecting the role of women in farmers' protests. Mentioning and reflecting all the stories and their struggles behind the back.





# Trolley Times

Trolley Times, a bilingual newspaper for farmers that was launched on December 17, 2020, With its first headline – **‘Unite, Fight and Win’** – and its name based on the tractor trolleys on which Punjab’s farmers arrived at the borders of Delhi to protest the new farm laws, it caught the imagination of the national and international media immediately. Trolley Times has so far printed **12 editions**, launched a digital edition and is soon to launch an official website. **Every week, 5,000 copies** of Trolley Times are printed, distributed **free of cost** and open to anyone for re-prints.



Source- Days 86 - Trolly Times Instagram





## Leaders who emerged during the protests.

### RAKESH TIKAIT

The man's tears turned into a 'selaab' and brought thousands of farmers to Delhi's borders. Son of legendary farmer leader Choudhury Mahendra Singh Tikait, who was revered by farmers across Haryana and UP, 54-year-old Rakesh Tikait is the new face of the farmers' protest. From placing flowers next to iron nails fixed by the police near the Ghazipur border to sweeping the road, Tikait has captured the imaginations of the people. His tears and appeals had a resounding effect and Ghazipur border turned into a sea of tractors overnight.





## **Dr. DARSHAN PAL**

The 70-year-old MD in anaesthesia is among the farmer leaders who have played a vital role in bringing the 31 organisations together for the agitation. Often seen moving around the crowd, checking on people and supplies, Dr. Pal now plays the role of coordinator for the farmer groups. Dr. Pal is considered the main force behind the unity of the farmer organisations and played an important role in taking the agitation beyond Punjab to farmers in Uttar Pradesh, Rajasthan, Karnataka and Maharashtra.



## **BALBIR SINGH RAJEWAL**

Balbir Singh Rajewal, 77, is a well-known figure in Punjab. He is the president of Bhartiya Kisan Union (Rajewal) since he broke away from BKU. Rajewal is among the leaders who have been at the forefront of the protest. He, along with others, is credited with bringing the movement from Punjab to Delhi. He is considered by many as the think tank and strategist of the movement..

## **NODEEP KAUR**

24-year-old Nodeep Kaur is a Dalit and labour rights activist, who is associated with the Mazdoor Adhikar Sangathan Union. She has now joined the ongoing farmers' protest at the Singhu border. Kaur garnered support after she was allegedly picked up by Haryana Police and kept in custody for protesting.





Even with several rounds of talks between the farmers' representatives and the government, deadlock still persists. No conclusion has come out of the talks and the farmers are adamant on their demand of withdrawing the three contentious laws. Women too have been a part of the movement since its beginning. As the protest entered its 100th day, women in large numbers came forward to continue the protest by taking part in blocking the KMP expressway. Farmers have also blocked the eastern peripheral expressway in Ghaziabad to observe the 'Black Day'. Farmers have been concerned that the laws will take away the Minimum Support Price (MSP) system and will do away with the 'mandi' system as well. One of their demands is a legal guarantee of MSP. Protesting farmers are marching on the KMP expressway with the flag of the farmers' unions to agitate against the laws. Bharatiya Kisan Union leaders accused the government of introducing the laws for the benefits of its corporate friends and said that the government is working as the puppets of the businessmen. They also highlighted that the godowns were built first and the laws came after. The farmers from all across the country, mainly from the states of Punjab, Haryana and Uttar Pradesh have been protesting against the Farmers' Produce Trade and Commerce (Promotion and Facilitation) Act, the Farmers (Empowerment and Protection) Agreement on Price Assurance and Farm Services Act, and the Essential Commodities (Amendment) Act passed by Parliament last year.





# Role of New National Education Policy 2020 in the Indian Education System



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## Why in News

Recently, the Union Cabinet has approved the new National Education Policy (NEP), 2020 with an aim to introduce several changes in the Indian education system - from the school to college level. The two earlier education policies were brought in 1968 and 1986. This is the first education policy of the 21<sup>st</sup> century and replaces the thirty-four-year-old National Policy on Education (NPE), 1986.

- The NEP 2020 aims at making “India a global knowledge superpower” and universalization of education from pre-school to secondary level with 100 per cent Gross Enrolment Ratio (GER) in school education by 2030 and aims to raise GER in higher education to 50 per cent by 2025.
- The Cabinet has also approved the renaming of the Ministry of Human Resource Development to the Ministry of Education.
- The NEP cleared by the Cabinet is only the third major revamp of the framework of education in India since independence.

**Highlights of the NEP 2020:** Advantages and disadvantages of NEP:

- NEP 2020 will bring two crore out of school children back into the main stream.





- The 10+2 structure of school curricula is to be replaced by a 5+3+3+4 curricular structure corresponding to ages 3-8, 8-11, 11-14, and 14-18 years respectively. It will include 12 years of schooling and three years of Anganwadi and pre-schooling.
- NCERT will develop a National Curricular and Pedagogical Framework for Early Childhood Care and Education (NCPFECCE) for children up to the age of eight.
- NEP 2020 calls for setting up of a National Mission on Foundational Literacy and Numeracy by the Education Ministry. States will prepare an implementation plan for attaining universal foundational literacy and numeracy in all primary schools for all learners by grade 3 by 2025.
- A National Book Promotion Policy is to be formulated.
- All students will take school examinations in Grades 3, 5, and 8 which will be conducted by the appropriate authority. Board exams for Grades 10 and 12 will be continued, but redesigned with holistic development as the aim.
- A new National Assessment Centre, PARAKH (Performance Assessment, Review, and Analysis of Knowledge for Holistic Development), will be set up as a standard-setting body.
- NEP emphasises on setting up of Gender Inclusion Fund and also Special Education Zones for disadvantaged regions and groups.
- Every state/district will be encouraged to establish "Bal Bhavans" as a special daytime boarding school, to participate in art-related, career-related, and play-related activities. Free school infrastructure can be used as Samajik Chetna Kendras.
- A common National Professional Standards for Teachers (NPST) will be developed by the National Council for Teacher Education by 2022, in consultation with NCERT, SCERTs, teachers and expert organizations from across levels and regions.
- States/UTs will set up independent State School Standards Authority (SSSA). The SCERT will develop a School Quality Assessment and Accreditation Framework (SQAACF) through consultations with all stakeholders.
- NEP 2020 aims to increase the Gross Enrolment Ratio in higher education including vocational education from 26.3 per cent in 2018 to 50 per cent by 2035 and aims to add 3.5 crore new seats to higher education institutions.
- The policy envisages broad-based, multi-disciplinary, holistic Under Graduate education with flexible curricula, creative combinations of subjects, integration of vocational education and multiple entry and exit points with appropriate certification.
- An Academic Bank of Credit is to be established for digitally storing academic credits earned from different HEIs so that these can be transferred and counted towards final degree earned.
- Multidisciplinary Education and Research Universities (MERUs), at par with IITs, IIMs, to be set up as models of best multidisciplinary education of global standards in the country.
- The National Research Foundation will be created as an apex body for fostering a strong research culture and building research capacity across higher education.
- Higher Education Commission of India (HECI) will be set up as a single overarching umbrella body for entire higher education, excluding medical and legal education.
- Public and private higher education institutions will be governed by the same set of norms for regulation, accreditation and academic standards.
- Affiliation of colleges is to be phased out in 15 years and a stage-wise mechanism is to be established for granting graded autonomy to colleges.
- A new and comprehensive National Curriculum Framework for Teacher



Education, NCFTE 2021, will be formulated by the NCTE in consultation with NCERT.

- By 2030, the minimum degree qualification for teaching will be a 4-year integrated B.Ed. degree.
- Stringent action will be taken against substandard stand-alone Teacher Education Institutions (TEIs).
- A National Mission for Mentoring will be established, with a large pool of outstanding senior/retired faculty who would be willing to provide short and long-term mentoring/professional support to university/college teachers.
- The National Scholarship Portal will be expanded to track the progress of students receiving scholarships.
- Private HEIs will be encouraged to offer larger numbers of free ships and scholarships to their students.
- Measures such as online courses and digital repositories, funding for research, improved student services, credit-based recognition of MOOCs, etc., will be taken to ensure distance learning is at par with the highest quality in-class programmes.
- A comprehensive set of recommendations for promoting online education consequent to the recent rise in epidemics and pandemics in order to ensure preparedness with alternative modes of quality education whenever and wherever traditional modes of education are not possible, has been covered.
- A dedicated unit for the purpose of orchestrating the building of digital infrastructure, digital content and capacity building will be created in the HRD ministry to look after the e-education needs of both school and higher education.
- An autonomous body, the National Educational Technology Forum (NETF), will be created to provide a platform for the free exchange of ideas on the use of technology to enhance learning, assessment, planning, administration.
- NEP recommends setting an Indian Institute of Translation and Interpretation (IITI), National Institute (or Institutes) for Pali,

Persian and Prakrit, strengthening of Sanskrit and all language departments in HEIs, and use mother tongue/local language as a medium of instruction in more HEI programmes.

- Internationalization of education will be facilitated through both institutional collaborations, and student and faculty mobility and allowing entry of top world ranked universities to open campuses in India.
- Stand-alone technical universities, health science universities, legal and agricultural universities etc will aim to become multi-disciplinary institutions.
- Policy aims to achieve 100% youth and adult literacy.
- The Centre and the States will work together to increase the public investment in Education sector to reach 6 per cent of GDP at the earliest.

### **NEP Will Install a New Agriculture Education System for New India:**

It happened after three decades that India is adopting a new policy for education. With time, the situation and apparatuses of teaching and learning have also changed. **Information and communication technology** has impacted all the aspects of life today, and education is no exception. Therefore, it was imperative to incorporate ICT in the education policy itself. Apart from the modes of teaching-learning, the components of curriculum also required incorporation of ICT, so that the coming generations get equipped with skills related to ICT and they could rely on themselves to not only understand, but also innovate. In this aspect, the new National Education Policy is a unique document. It introduces a multidisciplinary education system where, student shall be able to study subjects of different streams simultaneously. Furthermore, the NEP, 2020 is a document that understands and incorporates the requirements of India. As we are a nation that highly depends on its agricultural sector. It was important to design the policy in such a way that it does not detach the younger population from agriculture.





As it said that “Anything can be done in laboratory, but for agriculture, you need to go into the field.” Supporting the former mentioned statement, government’s new national education policy promises to build a holistic approach in the preparation of professionals by providing vocational training. Under NEP, an improved agricultural education system can be developed for the present situation of the agricultural studies. In the present education system there are more than 10,000 engineering colleges (approved by AICTE) with more than 15 lakh seats, and more than 400 medical colleges with approximately 53,000 seats institutionalized for students. Whereas there are only 75 universities (under ICAR) opened for agricultural education with an average rate of 15000 students per year.

### **The Impact of National Education Policy 2020 on Professional Education:**

The NEP 2020 talks about professional education and the need to revive and develop Professional Courses in Agriculture, Law, Healthcare and Technical fields. Professionals play an important role in the development of any economy. The NEP says that the Professional Courses should involve education in the ethic and importance of public purpose, an education in the discipline, and an education for practice. It must also involve critical and interdisciplinary thinking, discussion, debate, research, and innovation. Professional Education should not be limited to the course speciality.

Professional education is an integral part of the overall higher education system. Agricultural universities, legal universities, health science universities, technical universities, and institutions in other fields, shall aim to become multidisciplinary institutions.

### **PM Modi pitches for taking farm education to middle school level under National Education Policy:**

Prime Minister Narendra Modi pitched for taking farm education to middle school level, saying necessary reforms have been made in this regard in the National Education Policy (NEP) 2020. “There is a need to take knowledge related to agriculture and its practical application to school level. Efforts are (on) to introduce the Agriculture subject at

middle school level in villages,” Modi said. This will develop agriculture related understanding in students and enable them to give information about agriculture, its modern farming techniques and marketing, to their family members, he said, adding this will promote agro-entrepreneurship in the country. “For this, many reforms have been made in the National Education Policy,” Modi said in an address after the virtual inauguration of college and administration buildings of Jhansi-based Rani Lakshmi Bai Central Agricultural University.

Currently, there are three central agricultural universities in the country, compared to just one university six years ago. Besides this, three more national institutions -IARI Jharkhand, IARI Assam and Mahatma Gandhi Institute for Integrated Farming in Motihari, Bihar - are being established.

He remarked that these institutions will not only give new opportunities to students, but will also help in increasing their capacity, in providing technology benefits to the local farmers. Modi further said in the last six years, the government has endeavoured to establish a link between research and farming, and to provide scientific advice to farmers, at the ground level in villages. He sought the cooperation of the universities in developing the ecosystem to streamline the flow of knowledge and expertise from campus to agriculture fields. Asserting that the farm sector has a major role to play in making India ‘Aatmanirbhar’ (self-reliant), Modi said, “When I talk about aatmanirbhar in agriculture, it is not limited to foodgrains but the self-reliance of a village/rural economy.”

Self-reliance in agriculture aims at making farmers both producer as well as entrepreneur. The growth of farmers and overall farm sector will lead to creation of jobs at village level, he said. To further boost the farm sector and double the income of farmers, Modi said the government is taking several historical reforms in the sector. He listed out the amendments in the Essential Commodities Act, and ordinances to allow farmers sell outside mandis.

“Just like other industries, now farmers can also sell their produce anywhere in the country, wherever they fetch better prices,” he said, adding that a special dedicated fund of Rs 1 lakh crore has been set up for providing better facilities and promoting industries in a cluster-based approach.

During the interaction, the Prime Minister also stressed on promoting recycling of water and



rainwater harvesting through innovative and less costlier technology in the region. He also mentioned that Israel's water technology can be of use. Besides, he talked about the need to increase agro-forestry, reduce consumption of chemical fertiliser, and adoption of organic farming as well as zero budget farming.

### Conclusion:

A New Education Policy aims to facilitate an inclusive, participatory and holistic approach, which takes into consideration field

experiences, empirical research, stakeholder feedback, as well as lessons learned from best practices.

It is a progressive shift towards a more scientific approach to education. The prescribed structure will help to cater the ability of the child – stages of cognitive development as well as social and physical awareness. If **implemented in its true vision**, the new structure can bring India at par with the leading countries of the world.

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# IMPORTANT GOVERNMENT SCHEMES & PROGRAMMES IN AGRICULTURE



## Empowerment of Agriculture Sector by Central Government of India



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### Introduction

Agriculture is the most important sector of Indian Economy. Indian agriculture sector accounts for 18 per cent of India's gross domestic product (GDP) and more than 70% of

population is depend on agriculture. This structure the main source of income. The commitment of agribusiness in the national income in India is all the more, subsequently, it is said that agriculture in India is a backbone for Indian Economy. Empowerment of agriculture through empowering the farmer because they are always back-bone of our country & the Government of India is striving to strengthen this back-bone of the country through innovative and solid measures.

**The growth of the nation is deeply connected to the wellbeing of the farmer and the productivity of farming.**

Farmer Empowerment is thus a priority for any government that intends to push our nation to

greater heights. The current government is led by Prime Minister Narendra Modi, a visionary who has taken strategic steps to accelerate a transformation in the farming sector with an ambition to empower farmers. Doubling farmers' income, securing them and their endeavors, making them tech savvy, boosting agriculture research and education, and building farm-related infrastructure are some of the major goals set and being worked upon for the growth of agriculture sector and farmers' welfare. The New India envisioned by Prime Minister Narendra Modi runs on his motto of Sabka Saath, Sabka Vikas' and farmer welfare is an integral part of it. The government raised budget allocation for Agriculture Ministry by 7.81 per cent to Rs. 52,655 crores for 2017-18 from Rs. 48,840.50 crores (revised estimate) of this fiscal (Ministry of Agriculture & Farmers' Welfare Government of India).

### Seeds quality and availability

The quality of crops is directly linked to seeds. Ensuring quality seeds are available in sufficient quantities to farmers especially during the sowing season is key to the health of the farming life cycle. Through Krishi Dak, developed by Indian Agricultural Research Institute (IARI), the government provides good quality seeds to farmers at their doorstep. After success in 20 districts, the



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scheme was extended in 100 districts of 14 states in association with Krishi Vigyan Kendras and “Beej gram yojana” is the most important for farmer.

### **Soil Health and Fertilizer**

Healthy soil is vital for agricultural productivity. Disproportionate use of fertilizers has affected soil health. Hence our government decided to combat it by educating farmers about the importance of soil health. A soil testing kit was developed for quick analysis of soil samples to optimize the use of fertilizers and provided to 650 Krishi Vigyan Kendras (KVKs). More than 6 crore soil health cards have been printed and distributed to farmers. Another milestone in our endeavors was provision of neem coated urea.

### **Water and Irrigation**

Water is a precious natural resource and lack of it leads to non-remunerative farming. Ensuring its availability and proper use is crucial to reform the farming sector. PM Modi launched Pradhan Mantri Krishi Sinchayee Yojana (PMKSY), an end-to-end solution to our nation’s irrigation woes, with the objective of “Water to Every Field”. This programme is working towards developing long-term remedies to mitigate the effect of drought. It is being implemented in mission mode by three ministries with Ministry of Water Resources, RD&GR leading the project. As announced in the recent budget, a dedicated micro irrigation fund with a sum of Rs. 5000 crores will be set up for the achievement of “Per Drop – More Crop”. Micro-irrigation is vital to ensure optimal use of water – minimum water, maximum yield and other important work for farmer empowering is the water restructuring project.

### **Finance and Security**

The availability of credit and access to capital at fair rates go a long way in empowering farmers. With our government pioneering financial inclusion at all levels, the next logical step is to help farmer's access capital through formal channels. The government increased agri-credit target by 11

per cent to Rs.10 lakh crore for next fiscal and announced two dedicated funds with a corpus of Rs. 5,000 crores for micro irrigation and dairy processing. The financial instability and havoc caused by unpredictable weather adds to farmer woes. Commitment to farmer empowerment also means securing them from uncertainty and stabilizing their income.

### **Farmer and the Market**

Another hindrance to the growth and prosperity of farmers has been the lack of an accessible and equitable common marketplace. Often, cartels would fix prices to their own benefit and deny farmers the profits that were rightfully theirs. E-National Agriculture Market (e-NAM), a pan-India e-trading platform has been launched to create a unified national market for agricultural commodities. It creates competition and better returns to the farmers commensurate to the quality of their yield. It also ends geographical barriers and buyer-seller information asymmetry, as it brings onto one single platform potential buyers and sellers from across the nation.

### **Integrated Farming Approach**

Farming is not an activity that happens in isolation. It has a host of allied sectors that directly and indirectly play key roles. It is important to bring in synergy between these allied sectors by taking an integrated approach. The interest of smallholder farmers is being taken care of by bringing allied sectors under the umbrella to expand the definition of farming. Farmers are also being educated to diversify their efforts and spread their potential. For example, horticulture. It offers varied options to the farmers who can grow fruits, nuts, tuber crops, mushroom, ornamental plants including cut flowers, spices, plantation crops and medicinal and aromatic plants. It facilitates better returns per unit of the area. The government also started the Blue Revolution to boost fisheries sector with increased investment, better training and development of infrastructure.





## **Technology Driven Farming**

The empowerment of agriculture by many Machinery Project and the need to find technological solutions to problems faced by the farmers is understood well by our government. PM Modi urged researchers to think about “an inch of land and a bunch of crops” and provide instant solutions. Foundation stone has been laid for the National Institute of Bio-Technology at Ranchi, Jharkhand to promote technological research in the field of agri-bio technology. We have made provisions to establish two new centers of National Agriculture Research Institutes - one each in Assam and Jharkhand. Also, the network of nationwide Krishi Vigyan Kendra is being expanded and strengthened to accomplish ‘Lab to Land’ mission. In the last two years, the number of KVKs has increased to 668 from 637.

## **Paramparagat Krishi Vikas Yojana**

The government has launched Paramparagat Krishi Vikas Yojana in order to address the critical importance of soil and water for improving agricultural production. The government would support and improve the organic farming practices prevalent in India. Following cluster approach mode of farming, at least 50 farmers would form a group having 50 acres of land to implement organic farming. The government aims to cover 10,000 clusters and five lakh hectares of arable land under organic farming within three years. Recently, the government has been active in investing in agricultural infrastructure such as irrigational facilities, mechanized farming, and warehousing. The growing use of genetically modified crops will also improve the sector’s contribution to GDP. While all of these initiatives look promising, in what way are they going to affect the current scenario is something interesting to watch out for.

## **Direct Benefit Transfer (DBT) For Fertilizer Sector**

Across the country, a silent revolution is taking place. Each time a farmer purchases

fertilizers from a dealer, he/she presses his or her thumb at a point-of-sale (PoS) device and an authenticated receipt comes out giving details of the purchase and subsidy to be paid by the government directly to the manufacturer. The records of dealers are automatically updated and payment is made digitally or in cash. Farmers, especially those purchasing urea, who were facing constraints of availability and occasionally overcharged in the past, now receive it at a printed price with complete transparency. It’s a little over one year since the committee set up by NITI Aayog decided to roll out the pilot on DBT in fertilizers in 16 districts. Since then DBT in fertilizers has been rolled out in 19 States and Union Territories and 12 States are expected to come on board this month. In another three months, DBT in fertilizers is expected to expand its footprint in the entire country. These initiatives have been supplemented with allied processes set in motion by the Department of Fertilizers including appointment of 24 State DBT co-coordinators and organizing about 4,500 training sessions across India.

An independent evaluation agency appointed by NITI Aayog conducted two rounds of surveys of the pilot districts to get ground-level feedback. In the latest round, they surveyed 5,659 farmers and 427 retailers across 14 districts in addition to government officials and stakeholders in six States. The key findings included: the Aadhaar authentication strike rate increased to as high as 97% in three attempts; 85% of farmers received transaction receipts, and 98% were charged the same amount as mentioned in the receipt; and the grievance redress mechanism has improved and 79% retailers are satisfied. Interestingly, despite initial challenges, a majority of farmers (and retailers) prefer the DBT system.

## **Promotion of National Agricultural Market through Agri-Tech Infrastructure Fund**

The Prime Minister Shri Narendra Modi, has given its approval to a Central Sector Scheme for



Promotion of National Agricultural Market through Agri-Tech Infrastructure Fund (ATIF). The Department of Agriculture & Cooperation (DAC) will set it up through the Small Farmers Agribusiness Consortium (SFAC) by creation of a common electronic platform deployable in selected regulated markets across the country.

An amount of Rs. 200 crores has been earmarked for the scheme from 2015-16 to 2017-18. This includes provision for supplying software free of cost by DAC to the States and Union Territories (UTs) and for cost of related hardware/infrastructure to be subsidized by the Government of India up to Rs. 30 lakh per Mandi (other than for private mandis).

The target is to cover 585 selected regulated markets across the country. 2015-16: 250 mandis, 2016-17: 200 mandis and 2017-18: 135 mandis. 585 regulated markets across the country will be integrated with the common e-platform to provide farmers and traders with access to opportunities for purchase/sale of agri-commodities at optimal prices in a transparent manner across the country. Besides, private markets will also be allowed access to the e-platform thereby enhancing its outreach. The Scheme is applicable on All-India basis. There is no State wise allocation under the Scheme. However, desirous States would be required to meet the pre-requisites in terms of carrying out necessary agri-marketing reforms.

Small Farmers Agribusiness Consortium will be the lead agency for the development of the National e-Market by the Ministry of Agriculture, and they will select a service provider through open bidding. An appropriate common e-market platform

will be set up that would be deployable in the selected 585 regulated wholesale markets in States/UTs desirous of joining the e-platform. The SFAC will implement the national e-platform in three phases during 2015-16, 2016-17 and 2017-18.

The e-marketing platform should promote reform of the agricultural marketing sector and apart from promoting free flow of agri commodities across the country and should result in greater farmer satisfaction as prospects for marketing of his produce would be significantly enhanced. Integration of agri-markets across the country through the e-platform is seen as an important measure for overcoming challenges posed by the present agri-marketing system namely - fragmentation of State into multiple market areas each administered by separate APMC, multiple levy of mandi fees, requirement for multiple license for trading in different APMCs, licensing barriers leading to conditions of monopoly, poor quality of infrastructure and low use of technology, information asymmetry, opaque process for price discovery, high level of market charges, movement controls etc.

### Conclusion

It is clear from above mentioned point the Government of India has taken step for the empowering the farmer in term there financial and social status. So, we can say the honorable Prime Minister Narendra Modi has a great vision for empowerment of farmers of India.

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## EMPOWERING YOUTH THROUGH AGRICULTURAL EXTENSION



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Rural youth make up a large proportion of the population in developing countries and face high unemployment rates. Involving youth in agricultural activities is a commonly cited solution, but it remains elusive. Rural youth in many developing countries are actively seeking employment opportunities in urban areas to face significant challenges to find farming-related or other work and access to land, information, finance and other services in their communities. The significant position of the agricultural sector in the economy and high potential for increased productivity creates the main opportunities for developing countries to start farms or small agricultural ventures for young people. Agricultural extension is related to the farming farmer and the entire farmer family, and extension programs should cater to the needs and interests of various family members.

### Agricultural Extension and Rural Youth

A large percentage of the population of many countries is under 18 years of age and the majority of the overall population lives in rural areas. Youth make up a large proportion of any rural population. These youth represent future farm families, and it is imperative that agricultural expansion does something to prepare them for the future. The alternative is to allow large numbers of youth to continue drifting away from rural areas and towns. For these reasons, extension agents should make a special effort to keep young people interested in their expansion work; they should visit

schools to talk about expansion and arrange visits to agricultural projects for young people to see what is happening.

When it comes to rural youth, both boys and girls are intended. Although there is no strict definition of youth, the boys and girls referred to are between 12 and 18 years of age. In many countries, there are now special expansion efforts on these youth. Examples include Youth Voluntary Service in India, Village Polytechnic in Kenya, Jamaica Youth Corps and. The spirit of these programs is to “catch them while they are still young”, to express



concern for the future of young people and to try and establish them in the rural area.

Rural youth present the agricultural extension worker with many special problems. The agent must first try to understand these problems and affect the likelihood of self-improvement of young people before starting any youth-oriented extension activities. Extended experience with youth in different parts of the world has revealed the following common problems:

### **Inspiration**

As young people see the neglect and backwardness of rural areas, they lose motivation and often see little hope for their own futures.

#### **1. Training**

Many youth would have been formally educated, but still lacked the necessary skills to live in rural areas. Often the youth is ill prepared and ill prepared for the demands of rural development.

#### **2. To incorporate**

Often young people feel isolated and unable to participate in local rural development activities. They have no representation and no means of making their voice heard.

#### **3. Opportunities**

There are very few programs that attempt to reach young people, or projects that seek to integrate youth into rural development activities.

Obviously an agent will not be able to solve all these types of problems immediately, but he can at least determine to prioritize youth extension activities in his extension program. He should make and maintain contact with the youth of his area, and give them some ideas to develop stimulating activities for them quickly. These activities often take the form of a club for young people, with special projects specifically for their benefit.

### **Club for rural youth**

Clubs have long been considered as an extension to involve young people in rural development to propose projects for their benefit.

The most widespread are the 4H clubs (hands, health, head and heart) which started in the United States and which have now spread to many countries. These clubs are important as a first step to bringing young people together; they give them an outlet to express their ideas and problems, and form a foundation from which to build for the future. Through them, young people also become accustomed to working with extension services, and they establish a relationship, which will develop when they build their own peasant families and require extension assistance.

When the expansion agent considers creating a club for youth in their area, they should give a lot of consideration to the project and keep in mind that these clubs have three main objectives.

#### **1. Educational**

In both formal and informal ways, a club can be a means by which youth can socialize and train for future life. Specific skills, leadership qualities and a general understanding of the problem of rural development can all be useful purposes of the club.

#### **2. Economic**

In particular, a club can be used to instruct youth in various aspects of agricultural practice, agricultural management or home economics. The club may also undertake specific projects designed to provide income for the youth.

#### **3. Recreational**

Not all club activities should be serious. It should encourage recreational activities and social events, such as sports, day trips and even dancing. In this way, young people will enjoy the club, and see it as an important part of their leisure time.

The agent should consult people locally before forming a club, and ensure that he or she receives parental support. It should also find a meeting-place and allocate some resources for its functioning. The agent's work with the club is similar to his work with farmers' groups, and similar issues arise.





Two important aspects are the selection of the club leader and the internal organization of the club. Often the club leader will also be a local, progressive farmer or teacher. The leader is not a member of the club and its function is to help guide and support the activities of the club. Leaders will manage the club, assist in the selection of projects, and will typically serve in an advisory role for club members. As the club develops, youth will need to be included in its organization. It may be in the form of a committee of members with a chairman, treasurer and secretary as officers of the committee. It is important for the agent to encourage the club to adopt an internal organization in order to provide some structure for discussion and for project work.

### **Projects with rural youth**

Project work, either with clubs or with rural youth in general, is a means by which youth can learn to do something rather than just talk or listen to lectures. The agent should encourage project activities with young people and allocate part of their local budget for such activities. These projects can be on an individual or a club basis, and should not be too ambitious initially. In terms of the approach to the project work and the steps involved in planning and implementation, the agent may consult other sections of this guide.

A useful way to start project work is to take young people on a journey to a farmer, or other agricultural projects, where they can see a particular activity for themselves. Local farmers are often willing to collaborate with a group of eager club members. In addition, the agent can arrange interactions by other locals, or perform them to explain a project. It is important for the agent to be enthusiastic about the project work and to try to engage the youth to discuss and make decisions. Examples of youth projects successfully carried out in different parts of the world include poultry, rabbit farming, vegetable growing, handicrafts, fish-pond farming and home improvement. Essentially, project work should be a learning experience. Projects are not only to provide useful additional

income or food supplies, but should also be a way to equip young people with skills and knowledge that are useful for educational and future. It is important that projects are successful, because failure can easily lead to disenchantment quickly. Therefore, the extension agent should focus more on the work of the youth, as he is actually preparing and creating for the future.

### **Conclusion**

Extension services play a key role in addressing challenges, and well-functioning extensions and advisory services are best placed to connect with youth and connect them to agricultural opportunities.

The extension services will first have to see the youth as potential agricultural entrepreneurs and work together to create good opportunities. Extension services usually focus on established farmers, sometimes more commercial farmers, at the expense of supporting women farmers and youth. Treating youth as legitimate clients allows the development of extension programs that directly engage youth using participatory approaches so that they can have input on program priorities. Successful programs, such as Youth in Agriculture, show young people how to create remuneration opportunities in agriculture, employing an agribusiness approach, hence achieving financial gains and independence and aspirations for certain positions.

To target youth, extension services must track and report on how many youth are served within the framework of their monitoring and evaluation.

Finally, if an extension agent is to work with rural youth, they should have a general sympathy with their ideas and ideals and feel comfortable working with them. It may be better, therefore, for young agents to take on the responsibilities of youth extension work in an extension service. Young people will need to identify with the agent and be prepared to work with and trust the extension if the expansion work is to be successful. □





## HYBRIDIZATION IN WHEAT: FUTURE PERSPECTIVE



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Hybrid is an  $F_1$  generation obtained by sexual and somatic crossing of two genetically distinct parents. In both cross and self-pollinated crops, hybrid varieties

offer increased yield and enhanced vigour, efficiency and quality, but hybrid varieties in cereals belonging to the self-pollinated crop domain have not been proven very good except for hybrid rice. It is possible to clearly explain the process of growing hybrid plant seeds. Two distinct varieties of the same plant are cross bred, each with specific characteristics. One plant has sterile female flowers, the other contains pollen and a new, special offspring is created by the fertilized plant is a hybrid.

### Hybrid wheat in India

Earlier after the year, 2005 number of efforts was made by the ICAR to exploit the heterosis in wheat. For this, a hybrid network project was initiated by ICAR in India using the CMS method during 2009-10, but there may be no hybrid varieties evolved. A Maharashtra-based hybrid seed company launched two wheat hybrids in 2002 using the CMS method for low-input cultivation.

However, in 2020 a wheat variety MACS- 6478 doubled the crop yield for farmers in Karanjkhop, a village in Maharashtra founded by scientists from the Agharkar Research Institute, Pune-an autonomous institute of the Department of Science and Technology. It matures in 110 days and is resistant to most races of stem and leaf rust. This is in contrast to the usual maturation after 140 to 150 days expected for commonly grown wheat varieties in northern India. This medium-sized amber grain contains 14 percent protein, 44.1 ppm zn and 42.8 ppm iron which is higher than other cultivated varieties. Farmers have a yield of 45-60 quintals per hectare with the new variety compared to an earlier average yield of 25-30 quintals per hectare. When cultivating Lok 1, HD 2189 and other old varieties but still there is a long way to go to override pure line varieties because recently, the Indian Agricultural Research Institute has released a new pure line variety of wheat named Pusa Yashasvi which is also known as HD-3226. It has a higher genetic yield potential as compared to other varieties of wheat. Pusa Yashasvi has a higher content of protein, zinc and gluten. The best feature of this variety of wheat is that it is highly resistant against all major rust fungi viz. brown/leaf, yellow/stripe and black/stem.

### System of Hybrid seed production

For a hybrid seed production program in any crop, male sterility and fertility restoration is needed. The





female parents must be male sterile, which is achieved by manual emasculation is carried out until it's cost-effective. This is done primarily through either of the following methods.

1. Cytoplasmic male sterility
2. Artificial induction through chemical hybridization agent
3. Photoperiod/temperature treatment
4. Genetic male sterility
5. Chromosomal sterility

### Future Perspective

**1. Heterotic gene pool identification:** The key bottleneck in the gene pool is the absence of ample yield heterosis is the commercialization of hybrid wheat. One should look for a world primary gene pool for this, which has not been used otherwise. The currently available Indian gene pool is largely a descendant of germplasm from CIMMYT. The success story of heterotic gene pools in maize can be taken into account in the identification of heterotic gene pools.

**2. Creation of novel genetic variability for yield component traits from secondary and tertiary gene pools and its evaluation:** As evident through CIMMYT wide hybridization program in creating novel gene pool through synthetic hexaploids. This helps in generating new variability altogether different from the variability presently used in various national wheat-breeding programs. The through genetic analysis synthetic hexaploids are essential to identify heterotic groups, floral biology to increase outcrossing potential, resistance source of various stresses.

**3. Improving the restoration of fertility through the accumulation of Rf genes:** In China to improve the restoration of fertility through recurrent selection or multiple crosses involving different restorers. In this case, the benefit of CHA facilitated male sterility for recurrent selection or poly cross mating may be taken. Biotechnical methods can also be used for Rf gene pyramiding and MAS recognition.

**4. Search for heterosis in diverse gene pools:** Polyploid nature of the Wheat crop has been blamed for lack of heterosis and intergenomic heterosis has already been exploited. But success in rice hybrids would give rise to new hopes. Identification of large compatibility genes in rice has opened up avenues for the use of high heterosis inter-sub-specific hybrids. Due to comparative mapping and synthesis in cereals, heterosis between spring, winter and optional wheat cultivars, as in the case of rice, maybe more commonly used. Further understanding of Photoperiod and Vernalisation may aid in the generation of hybrids between spring and winter gene pools.

**5. Fixation of heterosis by apomixis:** This can be a challenging goal in the case of cereals where endosperm is the main part in terms of economic significance. It may not be possible to grow proper endosperm by apomixes. However, some solutions could be given to advances in modern biotechnology. The only close relative of wheat with an apomictic gene is *Elymus rectisetus*, which may be well studied for this reason.

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## IMPORTANCE OF FOOD QUALITY MANAGEMENT IN FOOD INDUSTRY



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The systems are applied in the quality assessment of all business subjects in the food industry, with the primary objective of protecting consumers and gaining their trust in safe food production and distribution. The adoption of food management systems also gives businesses in the food industry the security and the competitiveness they need on the market. Quality management systems keep up with market globalization and are consequently applied as standard worldwide.

### Introduction

Quality management plays a vital role within the food industry, across many different stages of sourcing, processing and packaging. In addition to basic laws and regulations on nutritive value, quality levels also incorporate factors such as shelf-life, raw materials, taste, texture, use of preservatives and many other indicators too. This makes it all the more important for food manufacturers to adhere to an efficient quality management system (QMS) in order to achieve standardization and meet the demands of consumers and authorities. In terms of quality control and management however, the term is used universally to ensure that all food products are processed according to strict guidelines. There are three principles of quality management that can be used to summarise the food processing process:

1. Raw material control
2. Process control
3. Finished product inspection

### Raw Material Control

Raw materials are the basic ingredients used to create food products. These could be fruit and vegetables that are farmed and harvested; cows, chickens, pigs and sheep that are farmed for their meat, eggs and dairy products and various other items. Naturally, raw material control is directly related to process control as raw ingredients will need to meet certain guidelines before reaching processing phases.

### Process Control

This principle relates to the process of food manufacturing. Ultimately, preventative measures are used alongside corrective measures – preventative strategies can only resolve a certain number of quality issues due to outside factors such as environment, storage and other such conditions. Many manufacturers work according to the Hazard Analysis Critical Control Point (HACCP) system as a result of this unpredictability. This system focuses on food safety as well as spoilage and other potential food risks. Total Quality Management (TQM) and





ISO 9000 standards also relate to manufacturing processes and quality guidelines.

### **Finished Product Inspection**

The third principle focuses on the final product – the packaged food that is then sold to consumers and suppliers. There are many forms of testing done at different stages – visual observation, physical tests and chemical tests are just some examples. Microbiological testing is very effective for determining health and sanitation controls, with a stringent monitoring process that incorporates records, data collection and the analysis of trends. External inspectors are also used alongside internal testers. Systems are designed for immediate corrective action when any products have raised red flags at any stage of the inspection, to reduce safety and hazard risks. While this is by no means a definitive guide to the intricate role that quality management plays within the food industry, it does at least offer more insight into the importance of an effective strategy for such industries and the need to consider quality management software to help with the implementation of that strategy.

Food quality is the quality characteristics of food that is acceptable to consumer. This includes external factors as appearance, texture and flavor such as federal grade standards.

- Recording all significant health events that occur during primary production
- Prohibition on marketing of infected products or products likely to be contaminated or hazardous for the consumer or for animal health.
- Inspection for food safety and food composition
- Inspection of premises
- Controls on the implementation of the legislation at all stages of the production, processing and distribution of foods of animal origin
- Establish that food business operators have primary responsibility for food safety
- Obligation on food business operators to withdraw all products likely to be hazardous to human or animal health
- Arrangements for inspection
- Conduct of inspection on the basis of veterinary expertise
- Relevant health standards
- Application of health identification marks, which are visible to the intermediate or final user
- Competent authority powers and means to rapidly withdraw hazardous products from the food chain or prescribe treatments or uses that ensure safety for human or animal health
- Recording coordinates of food business operators.
- Implementation by operators of procedures based on HACCP principles.
- Prior authorization of operators whose activities are likely to constitute a significant risk to human or animal health.

Analysis of foods is continuously requesting the development of more robust, efficient, sensitive, and cost-effective analytical methodologies to guarantee the safety, quality, and traceability of foods in compliance with legislation and consumers' demands.

### **Importance of Food analysis**

- Characterization of raw materials.
- Monitoring of food properties during processing.
- Characterization of final product.
- To development of porous monolith micro-extraction techniques for determination of veterinary residues in food matrices.
- To use of the so-called QuEChERS (quick, easy, cheap, effective, rugged, and safe) methodology for determining pesticide residues in food matrices.
- The application of immune affinity column clean-up techniques in food analysis.



- To development of solid-phase micro-extraction (SPME) techniques for quality characterization of food products.
- Application in ultrasound-assisted extraction to the determination of contaminants in food and soil samples.
- The use of liquid phase micro-extraction in food analysis.
- Description of sample preparation strategies used for the analysis of aflatoxins in food and feed antibacterial residues in foodstuffs.
- Determination of pesticides in foods analysis of volatile fractions or fatty acids in foods.
- Electro driven separation techniques such as capillary electrophoresis (CE) or microchip capillary.
- Electrophoresis have found important applications in food analysis.
- The detection of genetically modified organisms, nucleosides and nucleotides in foods analysis of contaminants in emerging food safety issues and food traceability.

## 2. Difference between subjective and objective evaluation

S.No	Subjective evaluation	Objective evaluation
1.	Uses individuals	Uses equipment
2.	Involves human sensory organs	Use physical and chemical techniques
3.	Results may vary	Results are repeatable
4.	Determines human sensitivity to changes in ingredients, processing or packaging	Need to find a technique appropriate for the food being tested.
5.	Determines consumer acceptance	Cannot determine consumer acceptance unless correlated with sensory testing
6.	Time-consuming and expensive	Generally faster and cheaper, and more efficient than a sensory testing

7.	Must for product development and for good marketing of new products	Essential for routine quality control
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## 2.1 Sensory Evaluation

Sensory evaluation is defined as a scientific method used to evoke, measure, analyze and interpret those responses to products perceived through senses of sight, smell, touch, taste and hearing. Rheology in sensory evaluation is used as an essential design tool in engineering food as it is important to processing, Shelf stability and sensory perception, including texture and mouth feel, and it can probe the overall structure as well as the interplay between individual colloidal components.

### Types of sensory tests

1. Difference / Discriminative tests
2. Rating test
3. Sensitivity tests

### 2.1a Sensory Instrument

A number of processes occur while food is being masticated, including deformation, flow, comminution, mixing and hydration with saliva, and sometimes changes in temperature, size, shape, and surface roughness of the food particles. All of these changes are recorded with great sensitivity by the human senses. The entire complex of events that occurs during mastication cannot be measured completely by instruments. There is no instrument available that has the sophistication, elegance, sensitivity, and range of mechanical motions as the mouth or that can promptly change the speed and mode of mastication in response to the sensations received during the previous chew. Modern sensory texture analysis was started by Dr. Szczesniak's group at the General Foods Corporation Technical Center in Tarrytown, New York in the early 1960s (Food Texture and viscosity).

It mainly determines

- Parameters of difference (eg. Taste, odour, juiciness, texture etc.)





- Extent of difference
- Consumer preferences

### 3. Comparison of destructive and non-destructive evaluation

S.No.	Criteria	Destructive evaluation	Non-destructive evaluation
1.	Purpose	It is carried to find properties and behaviour of specimen under different load	It is used to find properties of material and to find out defects
2.	Specimen	Specimen is damaged during test	Specimen is not damaged during test
3.	Defects	Defects cannot be found using Destructive testing	Defects are found using Non Destructive testing
4.	Cost	More Costly	Less Costly
5.	Example	Bending Test, Tensile Testing, Compression Testing, Impact testing etc.	Ultrasonic testing, Liquid die penetrant method, eddy current testing.

### Non-Destructive Techniques for Food Quality Analysis

Increasing consumer awareness towards food safety and health has led to a demand in quality enhancement of fruits and vegetables. To meet these demands there is a need to adopt objective, quantitative and non-destructive modes of food quality assessment. Non-invasive instrument-based methods are preferred to destructive techniques because they allow the measurement and analysis of individual fruit, reduce waste and permit faster repeated measures on the same item over time. This report aims to cover the recent techniques employed in destructive and non-invasive sensing and measurement for quality attributes of food. Some of

the techniques of recent origin adopted in the food and health sector have been discussed in this report. **Near-infrared spectroscopy (NIR)** is non-destructive method for the determination of firmness, freshness, Brix value, acidity, colour, and other characteristics of many fruits. The near-infrared range covers the wavelengths from 750 to 2500 nm, equal to the wave number range of 4000/cm to 12500/cm and is well suited for the determination of chemical compounds containing OH<sup>-</sup>, CH<sup>-</sup>, and NH<sup>-</sup> groups. The interpretation of the spectra may take place via direct spectrum identification using data bases or increasingly by applying procedures of high-speed chemometrics. The complex spectral data are often pre-treated by statistical procedures, to facilitate the handling.

**Nuclear Magnetic Resonance (NMR) and Magnetic Resonance Imaging (MRI)** instruments which have been reported to measure water content and water distribution at high data conveying speed with high performance. Some other applications of these technologies include the rapid sensing of internal browning of whole apples and assessment of ripening, defect and decay in fruits and vegetables.

**Fluorescence and Delayed Light Emission (DLE)** gives information about the photosynthetic activity from the fluorescence measurements of chlorophyll containing biological compounds. This study helps in determining the ripening of vegetable parts. The measurements are based on the radiation of electromagnetic energy within the visible range after excitation by short wavelength light, usually UV light.

**X-ray micro-tomography and Scanning Electron Microscopy (SEM)** allows scanning an entire sample to obtain such information as total pore volume and pore size distribution without the need of serial cuts. This technique has been applied successfully to obtain reliable microstructural information of many products undergoing different physical and chemical processes. These technologies are often coupled with image analysis



as a non-destructive technology for food structural studies.

**Visible Spectral Range (VIS)** and image analysis are used for sorting of fruits and other products at packaging lines. The spectral data are mathematically corrected using standard spectra that reflect the average responses of the 3 different colour receptor cell types of human eyes.

**Flame Photometry** is designed to provide a flame whose temperature is hot enough to excite as many elements as possible, to determine which wavelengths are given off, and to measure their intensities. It is possible to determine between 50 and 60 elements using present-day instruments. Each metal has a different set of energy levels because each has a different nuclear charge and a different number of electrons. Therefore the wavelengths of emitted radiation will be different for each element, and a measure of the position of these wavelengths when they are dispersed can be used to identify which atoms are present. If the intensity of this radiation is measured, then quantitative analysis is also possible.

**Atomic Absorption Spectroscopy** contains a source of radiation whose wavelengths are exactly the same as those required to excite the atoms in the flame, thereby providing a much more efficient way for the neutral atoms to be excited. At the present time the following elements cannot be determined directly by AA spectroscopy: Fr, Ra, Ac, Tc, Os, C, N, P, O, S, Po, all halogens, all inert gases, and Pm in the rare earths. However, with an atomic emission detector (AED) the nonmetals and halogens can now be detected.

**Liquid Chromatography** system consists of an inert phase solid support upon which is coated a liquid stationary phase. The separation is based upon the relative solubilities of the sample compounds in the stationary phase. One major difficulty is that under high pressure the stationary phase is often readily stripped from the solid support. One way to reduce this is to saturate the mobile phase with the stationary phase before the separation begins.

**Paired-ion chromatography (PIC)** in its most popular application is a modification of reverse-phase liquid-solid chromatography. It is based entirely on concentration equilibrium and can be used to separate highly polar materials with a nonpolar surface.

**Densimetry** is used to measure density which is an important criterion of seed purity; texture and softness of fruits; maturity of such products as peas, sweet corn, and lima beans; it has also been proposed as an index of soundness of dried prunes or plumpness and dryness of raisins. The determination in liquids provides a useful parameter whenever the density of a mixture of two compounds is a function of its composition, and when the composition can be read off calibration graphs or tables. This procedure is used to determine the sugar or alcohol content of aqueous solutions.

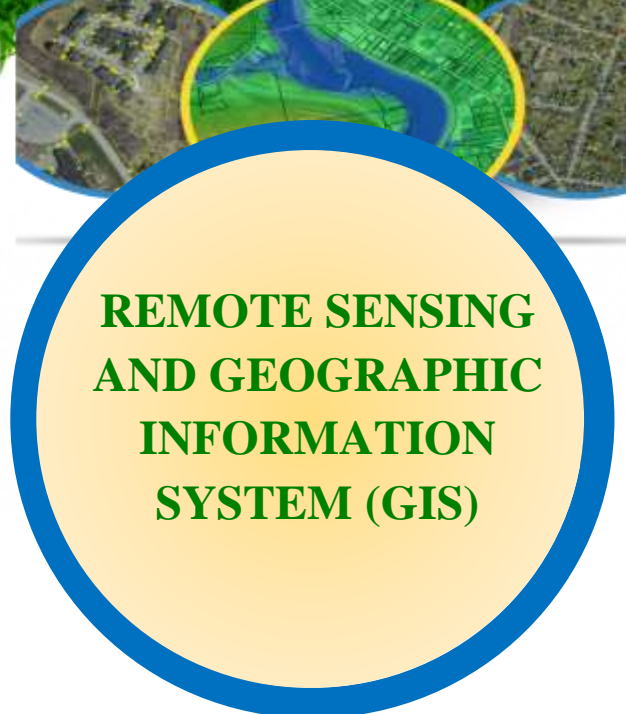
There are a few non-destructive technologies which are still in their developing phase such as Terahertz radiation which are yet to be explored. All the methods described in this report have their strengths and weaknesses and special aptitudes for special applications, but the ideal method covering all requirements of today's and future applications in production, storage, and retail has not yet emerged. The development so far deals with synergistic combinations of the existing technologies such as MRI with ultrasound. Therefore, this report aims to highlight some of the researchable issues which may pave the path for new and improved technologies to enter into the food processing sector.

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## REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEM (GIS)



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### Remote Sensing

Remote sensing is the acquisition of information about an object or phenomenon without making physical contact with the object and thus in contrast to on-site observation, especially

the Earth. Remote sensing is used in numerous fields, including geography, land surveying and most Earth Science disciplines (for example, hydrology, ecology, meteorology, oceanography, glaciology, geology); it also has military, intelligence, commercial, economic, planning, and humanitarian applications.

A device to detect the electro-magnetic radiation reflected or emitted from an object is called a “remote sensor” or “sensor”. These sensors collect data in the form of images and provide specialized capabilities for manipulating, analyzing, and visualizing those images. Remote sensed imagery is integrated within a GIS. Cameras or scanners are example of remote sensors.

Remote sensing is the process of detecting and monitoring the physical characteristics of an area by measuring its reflected and emitted radiation at a distance (typically from satellite or aircraft). Special cameras collect remotely sensed images, which help

researchers "sense" things about the Earth. Some examples are:

- Cameras on satellites and airplanes take images of large areas on the Earth's surface, allowing us to see much more than we can stand on the ground.
- Sonar systems on ships can be used to create images of the ocean floor without needing to travel to the bottom of the ocean.
- Cameras on satellites can be used to make images of temperature changes in the oceans.

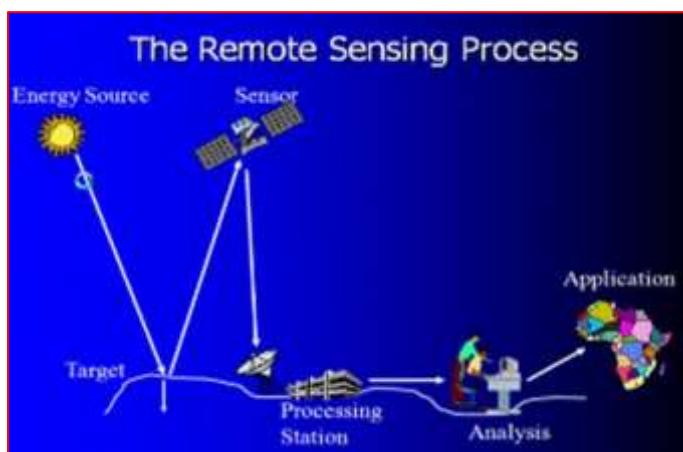
The characteristics of an object can be determined, using or emitted electro-magnetic radiation, from an object. That is, “each object has a unique and different characteristics of reflection or emission if the type of detect or the environment condition is different”. Remote sensing is a technology to identify and understand the object or the environmental condition through the uniqueness of the reflection or emission.

It is used to gather information about the surface of the earth from a distant platform, usually a satellite or airborne sensor. Most remotely sensed data used for mapping and spatial analysis is collected as reflected electromagnetic radiation, which is processed into a digital image that can be overlaid with other spatial data.

## GIS

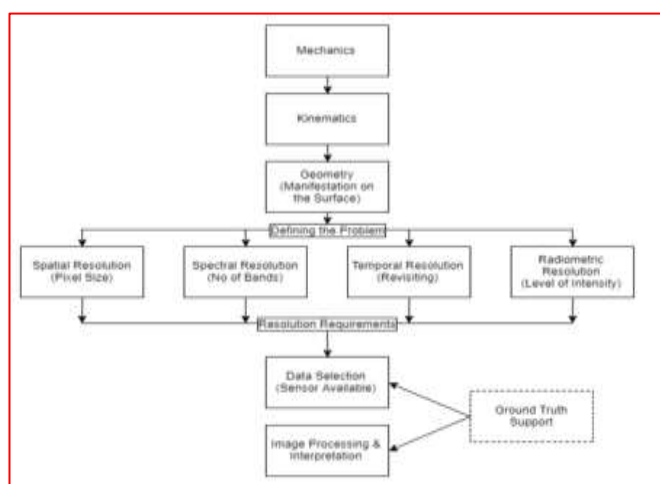


Reflected radiation in the infrared part of the electromagnetic spectrum, which is invisible to the human eye, is of particular importance for vegetation studies. For example, chlorophyll



strongly absorbs blue (0.48  $\mu\text{m}$ ) and red (0.68  $\mu\text{m}$ ) wavelength radiation and reflects near-infrared radiation (0.75 - 1.35  $\mu\text{m}$ ). Leaf vacuole water absorbs radiation in the infrared region from 1.35 - 2.5  $\mu\text{m}$  (Samson, 2000). The spectral properties of vegetation in different parts of the spectrum can be interpreted to reveal information about the health and status of crops, rangelands, forests and other types of vegetation.

**Figure A: - Data Collection by Remote Sensing**



**Figure B: - Flow Chart of Remote Sensing**

In figure “A” shows data collection by remote sensing while figure “B” shows the flow of remote sensing,

Where three different objects are measured by a sensor in limited number of bands with respect to their, electro-magnetic characteristics after various factors have affected the signal. The remote sensing data will be processed automatically by computer and manually interpreted by humans, and finally utilized in agriculture, land use, forestry, geology, hydrology, oceanography, metrology, environment etc.

## Geographic Information System

The Geographic Information System also known as GIS is a newly emerging discipline of applied sciences. GIS is concerned with the collection or capture of spatial data by such methods as satellite remotely sensed images, aerial photographs, Global Positioning System (GPS), Light Detection and Ranging (LIDAR) maps and surveys of people. GIS is an advanced version of Information Technology (IT) and Information Communication Technology (ICT) which provides quick data/information with digital maps. It provides a unique opportunity for integration of data and information on natural and human resources, and environment which in turn helps to develop decision support systems for planners, administrators, decision-makers and researchers of physical, biological, chemical and social sciences. A thorough understanding of GIS is, therefore, necessary for effective utilization of natural resources and inefficient administration, planning, monitoring and decision making.

A geographic information system (GIS) is a system designed to capture, store, manipulate, analyze, manage, and present spatial or geographic data. GIS applications are tools that allow users to create interactive queries (user-created searches), analyze spatial information, edit data in maps, and present the results of all these operations. GIS (more commonly GIS science) sometimes refers to geographic information science (GIS science), the science underlying geographic concepts, applications, and systems.





GIS can refer to a number of different technologies, processes, techniques, and methods. It is attached to many operations and has many applications related to engineering, planning, management, transport/logistics, insurance, telecommunications, and business. For that reason, GIS and location intelligence applications can be the foundation for many location-enabled services that rely on analysis and visualization.

GIS can relate unrelated information by using location as the key index variable. Locations or extents in the Earth space-time may be recorded as dates/times of occurrence, and x, y, and z coordinates representing, longitude, latitude, and elevation, respectively. All Earth-based spatial-temporal location and extent references should be relatable to one another and ultimately to a "real" physical location or extent. This key characteristic of GIS has begun to open new avenues of scientific inquiry.

GIS is a combination of hardware and software that enables: a collection of spatial data from various sources (remote sensing is one of them). It deals with spatial/tabular data, performs spatial/tabular analysis, and designs the layout of a map.

GIS software can handle both vector and raster data. Remote sensing data are of the raster type and usually require specialized data manipulation procedures that a regular GIS does not provide. However, after a remote sensing analysis is performed, its results are usually added to a region's database within a GIS or for further analysis (possibly overlaying with other layers). Over the past few years, more and more vector capabilities have been added to remote sensing software, and some remote sensing functions have been inserted into the GIS module.

The basic fundamental of GIS is geographic data and information. The focus is on understanding the basic structure of geographic data, and how

issues of accuracy, error, and quality are paramount to properly using GIS technology. The establishment of a robust database is the cornerstone of a successful GIS.

### GIS Principles

- The computer is an unavoidable technology in our time. We are living in the digital age, which has become an important element in nearly all professions.
- Computer training in most scientific disciplines is essential. Without this technology all professionals will be handicapped.
- The GIS is an inevitable technology that will be used in all scientific fields. The GIS has become the accepted and standard means of using spatial data.
- GIS is more Accurate Flexible, Object Efficient, and Rapid Fun comparing with the traditional method of spatial data inventory.
- GIS is replacing traditional cartography. Much of traditional "pen and ink" cartography done by skilled draftsman and artist is being replaced by GIS.
- GIS is opening new horizons. New mode of analysis and applications are constantly discovered.

### The Early History of GIS

The field of geographic information systems (GIS) began as computers in the 1960s and the earliest concepts of quantitative and computational geography emerged. Initial GIS work included significant research by the academic community. Later, the National Center for Geographic Information and Analysis, led by Michael Goodchild, formalized research on key geographic informatics topics such as spatial analysis and visualization. These efforts fueled a quantitative revolution in the world of geophysics and laid the basis for GIS.

### GIS Today

GIS gives people the ability to create their own digital map layers to help solve real-world



problems. GIS has also evolved as an instrument for data sharing and collaboration, inspiring a vision that is now rapidly becoming a reality - a constant, overlapping and interconnecting of the world in almost all disciplines -GIS database. Today, hundreds of thousands of organizations are sharing their work and creating billions of maps every day to tell stories and reveal patterns, trends and relationships about everything.

### **The Future of GIS**

With its movement with real-time information through web and cloud computing and the Internet of Things, GIS has become a platform relevant to almost every human endeavor on the planet - a nervous system of the planet. As our world faces problems with increasing population, loss of nature and pollution, GIS will play an important role in understanding and addressing these issues and provide a means for communicating solutions using the common language of mapping.

### **Techniques and technology**

Modern GIS technologies use digital information, for which various digitized data creation methods are used. The most common method of data creation is digitization, where a hard copy map or survey plan is transferred into a digital medium through the use of a CAD program, and geo-referencing capabilities. With the wide availability of ortho-rectified imagery (from satellites, aircraft, Helikites and UAVs), heads-up digitizing is becoming the main avenue through which geographic data is extracted. Heads-up digitizing involves the tracing of geographic data directly on top of the aerial imagery instead of by the traditional method of tracing the geographic form on a separate digitizing tablet

### **Components of GIS**

**Hardware:** - Hardware is the computer system on which a GIS operates. Today, GIS software runs on a wide range of hardware types, from centralized

computer servers to desktop computers used in stand-alone or networked configurations. The machine where the GIS can be run (computer, digitizer, plotter, printer).

**Software:** - GIS software provides the functions and tools needed to store, analyze, and display geographic information. A review of the key GIS software subsystems is provided above. The program needed to run the GIS (ArcGIS and its extensions).

**Data:** - Perhaps the most important component of a GIS is the data. Geographic data and related tabular data can be collected in-house, compiled to custom specifications and requirements, or occasionally purchased from a commercial data provider. A GIS can integrate spatial data with other existing data resources, often stored in a corporate DBMS. The integration of spatial data (often proprietary to the GIS software), and tabular data stored in a DBMS is a key functionality afforded by GIS.

**Organization and People:** - GIS technology is of limited value without the people who manage the system and develop plans for applying it to real world problems. GIS users range from technical specialists who design and maintain the system to those who use it to help them perform their everyday work. The identification of GIS specialists versus end users is often critical to the proper implementation of GIS technology. This is the most important part of the GIS structure. The GIS is too important and so costly that it cannot be considered just equipment. It requires organization and staff to utilize this technology. Unfortunately many organizations treat the GIS as equipment rather than an important analysis tool.





# VOCATIONALIZATION OF EDUCATION: AN OVERVIEW



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## Introduction

Education is the process of facilitating learning, or the acquisition of knowledge, skills, values, beliefs, and habits. It can take place in formal or informal settings and any experience that has a formative effect on the way one thinks, feels, or acts may be considered educational. Vocationalization means individual's development of talent and skills in the choice and enjoyment of career.

## Vocational of education

Vocational of education is sometimes referred to as career education or technical education. It is education that prepares people to work in various jobs, such as a trade, a craft, or as a technician. It can take place at the post-secondary, further education, and higher education level.

## History of Vocational Education in India

The Vocational Education Program (VEP) was started in 1976-77 under the program of Vocationalization of Higher Secondary Education in general education institutions. National Working Group on Vocationalization of Education reviewed VEP which led to the development of the Centrally Sponsored Scheme (CSS) on Vocationalization of Secondary Education since 1988. The Scheme provides for financial assistance to the States to set up administrative structure, preparation of curriculum, text book, training manual, teacher training programme, and evaluation etc.

## Purpose of Vocationalization of education:

- To develop a healthy attitude among students towards work and life.
- To enhance individual employability.
- To reduce the mismatch between the demand and supply of skill man-power.
- To provide an alternative for those intending to pursue higher education without particular interest or purpose.
- To prepare students for identified vocations spanning several area of activity.
- An emphasis in vocational education will also be on development of attitudes, knowledge, and skills for entrepreneurship and self-employment.



## Agencies involved in management of Vocationalization of education

- Vocational education falls under the purview of the Ministry of Human Resources Development (MHRD).
- The All-India Council for Vocational Education (AICVE), under MHRD, is responsible for planning, guiding and coordinating the program at the national level.
- Ministry of labour and employment, Directorate of employment and training.
- State Councils for Vocational Education (SCVE) perform similar functions at the state level.
- Directorate of Technical Education, Private Sector, NGOs at state level.

## Aims of Vocationalization

1. To increase the productive potential of the country.
2. To raise the economic standard of people.
3. To reduce the level of unemployment by providing self-employment schemes.
4. To utilize man-power to fullest extent.
5. To help for equitable sharing of benefits of economic development to ensure social and economic justice.
6. To make use of material and human resources.
7. To exploit the scientific and technical knowledge for betterment of the society.
8. To generate in pupils a love and appreciation for work.

## Importance of Vocational Education

It provides great learning experience. Term itself denotes the students are specialized so there are more chances of employment as compared to others. It makes an individual a responsible and independent. Majority of vocational skills are applicable all over the world. School drop-outs and adults can also receive this education to learn skill.

Hands-on work activities allow direct application of acquired knowledge.

## Education Commission of India

1. **Secondary Education Commission (1952-53)**  
- aim is to improve the vocational efficiency of the students. The commission emphasized on increasing the productive & vocational efficiency of students and it recommended diversified courses in multipurpose schools.
2. **The Indian Education Commission (1966)**  
pointed out that vocationalization can bring education into closer relationship with productivity. It increases the emphasis on agricultural and technological education.
3. **The National policy on Educating (1986)**  
formulations gave stress on the introduction of systematic, well planned and implemented programs of vocational education.

## Need of Vocational Education in India:

- ❖ Two main sources of Vocationalization of education:
  - (a) Formal training centers
  - (b) The informal or hereditary mode (generation to generation).
- ❖ Vocational courses are becoming quite popular among youth because it provides employment than conventional courses.
- ❖ The importance of the relationship between education and work which implies empowering people for work.
- ❖ It provide work experience
- ❖ Beneficiary is neo- literates, school drop-outs, working persons and unemployed or partially employed. Persons with special attention to women.

## Current Scenario of Vationalization of Education in India:

- High dropout rate at Secondary level: Vocational Education is presently offered at senior secondary level but the students at this level aspire for higher education.





- The vocational system doesn't put much emphasis on the academic skills, resulting in lower incidences of vertical mobility.
- There is a lack of participation by private players in the field of vocational education.
- There is a lack of opportunities for continuous skill up-gradation.
- There is no clear provision of certifications and degrees for the unorganised/informal sector.
- Challenges faced by ITCs and ITIs are poor quality trainers or lack of flexibility.

### **Advantages of Vocationalization of Education:**

It aims at reducing unemployment among the educated youth and thus helps solving the giant problem of unemployment. It will entail many economic benefits by increasing productivity which brings economic prosperity to the people and country as well. It is for short duration and economical. It provides hand on experience.

### **Limitation of Vocationalization of education:**

It has limited flexibility. Costly because of advertisement and promotion. It may develop wrong attitude among learner. Curriculum of Vocational education is narrow. Medium of instruction is may or may not suitable. Lack of continuous education.

### **Conclusion**

Education is the process of being desirable changes in the behavior whereas vocational of education is referred to as career education or technical education. It is concluded that Vocationalization of education provides great learning experience and reducing unemployment among the educated youth with the support of various education commission of India. Based on the many review of literatures article revealed that there is need for providing awareness to the people through intervention plans which helps to change the attitude regarding Vocationalization of education.

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# FARM BILL 2020:

## AN ATTEMPT TO IMPROVE FARMER'S CONDITION IN INDIA

### Introduction

Farm bill 2020 also known as Indian agriculture acts 2020, are three acts initiated by the Parliament of India in September 2020.

### Bill Introduction

In 2017, the central government had released model farming acts. The Standing Committee on Agriculture (2018–19), however, noted that several reforms suggested in the model acts had not been implemented by the states. In particular, the Committee found that the laws that regulated Indian agricultural markets (such as those related to agricultural produce market committees or APMCs) were not being implemented fairly and honestly or serving their purpose. Centralization was thought to be reducing competition and (accordingly) participation, with undue commissions, market fees, and monopoly of associations damaging the agricultural sector.

A committee consisting of seven Chief Ministers was set up in July 2019 to discuss implementation. The committee is yet to submit its report. The centre promulgated three ordinances in the first week of June 2020.

The three farm acts are as follows-

### 1. The Farmers' Produce Trade and Commerce (Promotion and Facilitation) Act, 2020

- i. Expands the scope of trade areas of farmers' produce from select areas to "any place of production, collection, aggregation".
- ii. Allows electronic trading and e-commerce of scheduled farmers' produce.
- iii. Prohibits state governments from levying any market fee, cess, or levy on farmers, traders, and electronic trading platforms for the trade of farmers' produce conducted in an 'outside trade area'.

### 3. Essential Commodities (Amendment) Act, 2020

- i. Removes foodstuff such as cereals, pulses, potato, onions, edible oilseeds, and oils, from the list of essential commodities, removing stockholding limits on agricultural items produced by Horticulture techniques except under "extraordinary circumstances".
- ii. Requires that imposition of any stock limit on agricultural produce only occur if there is a steep price rise.

### 2. Farmers (Empowerment and Protection) Agreement on Price Assurance and Farm Services Act, 2020

- i. Provides a legal framework for farmers to enter into pre-arranged contracts with buyers including mention of pricing.
- ii. Defines a dispute resolution mechanism.



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## Reactions

On 20 September 2020, Prime Minister Narendra Modi referred to the bills as a watershed moment in the history of Indian agriculture and stated the bills will "ensure a complete transformation of the agriculture sector" and empower tens of millions of farmers. In the Prime Minister's *Mann ki Baat* radio address on 29 November 2020, he said that "all political parties had been making promises to the farmers but now these promises had been fulfilled.

## Response from farmers and opposition parties

The acts have faced protests from farmers in various parts of India alleging that it will hurt their earnings. The main reasons for opposition is the uncertainty regarding the implementation of the reforms, controversy surrounding the minimum support prices (MSPs) and low bargaining power of the farmers are some of the fears that have led to the opposition to the bills.

## Protests

Since the proposal of these laws, different protests have come underway in different states of India. These protests are the first large-scale farmer protests since the Narendra Modi government came into power in 2014. On 26 November 2020, farmers from Haryana were stopped from entering Delhi by Haryana police.

## Conclusion

Farm bill 2020 has been collectively opposed by the farmers because of its obvious discrepancies. The primary bill i.e. Farmers' Produce Trade and Commerce (Promotion and Facilitation) Act is meant to get rid of the inter-state

barrier; allowing farmers to sell their produce freely in any state. The Act primarily broadens the scope of trading by narrowing the gap between corporate giants and farmers. This significantly improves the financial standing of the farmers. The Farm Bill 2020 overcomes the widespread limitation of selling agro produce at one destination by employing an open market system. Majority of the farmer believes that it and likely to erode their financial standing gradually. However, the Government has a different thought on this, as they strongly believe that this reform will impart more transparency and accelerates the growth of the sector. Therefore, we can conclude by saying that the Government has to come with amicable solutions to fill up the gap.

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## Pig farming, advantages and its SWOT Analysis



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### Pig Farming

Pig farming is one of the most sustainable industries in India. About 90 per cent of pigs are raised in the north east region of the country. Pig farming is the raising and reproducing of homegrown pigs as domesticated animals, and is a part of creature farming. Pigs are farming primarily for food (for example pork, bacon, gammon) and skins.

Among the animals species, pig finds a significant spot as it being raised by socio-monetarily more fragile segments of the general public. Pig when contrasted with other animals species has an extraordinary potential to add to quicker financial re-visitation of the ranchers, as a result of certain innate qualities like high fruitfulness, better-feed change productivity, early development and short age span. Pig cultivating additionally requires little speculation on structures and types of gear. It can possibly guarantee nourishing and monetary security for the more fragile areas of the general public.

An estimated half a million people in India are involved in pig farming. There has been a noticeable increase in pig farms in India in states like West Bengal, Uttar Pradesh and Rajasthan. The Indian census 21012 noted a significant drop in indigenous breed from 10 million (1992) to 7.8 million (2012), and increase in exotic breeds from 1.85 to 2.45 million. This shows the clear trend despite of the small numbers. There has been also a great demand of pork for making bacon and sausages, with the opening chains of international restaurants.





Ensure food and nutritional security

Contributes in the production of fiber's and hide skins like wool, hair and hides etc.

Cattle wealth especially bullocks still are backbone of Indian Agriculture

Cattle wealth especially bullocks still are backbone of Indian Agriculture

Dung and other animal waste serve as very good farm yard manure

Contributes in the production of Biogas and bio-diesels.

Weed and pest control

Livestock provide cushion to farmers at the time of droughts

Essential source of farmers' non-farm income



A special class does piggery in our country whereas abroad it has become a big business. In recent years, many young people have shown interest in pig rearing and in anticipation of profit in

rural areas, pig farms are also opening in place. It is necessary that pig farming should given the form of domestic business for the economic upliftment of the weaker section of the society.

### **Pig farming- for whom?**

- Small and landless farmers
- Part time earning for educated youth having agriculture as occupation
- uneducated youth
- Farm women

### **Breeds of pig:**

The indigenous pig has been the basis used for pig production for a long period of time. It is small in size. Improved breeds are now being use for grading up the form the basis for pig production in the rural areas.

#### ❖ The imported pig breeds reared in India

- Large white Yorkshire
- Landrace
- Middle white Yorkshire

#### ❖ Breeds for north east India

- Hampshire
- HSX1
- Large
- White Yorkshire
- Duroc
- Landrace

#### ❖ Indigenous type

- Ghungroo pig

### **Selection of breeding stock:**

Important characteristics, which need to be considered in developing a good sow herd, are:

- Size of litters
- Strength and vigour of litters
- Milking ability
- Temperament

### **Role of government**

- NABARD (support the State Piggery Farms, and importation of germplasm)
- DAHD&F(Guide in Implementing an Effective Bio-security Plan in pig farm).



## SWOT analysis of piggery in India

As a pig farming business, we give the impression of being promote to maximize our strength and opportunities and to work around our weakness and threats. Now is a summary from the result of the SWOT analysis that concluded on behalf of survey of farms.

### Strength

- High profitability and revenue.
- Piggeries can be established in relatively small areas.
- Feed costs are much lower than other meat production costs.
- The demand for pork meat has increased significantly over the years due to the high prices and unavailability of red meat substitutes.
- Regulatory compliance.
- The turnaround production time is quicker than red meat production. It is becoming a meat of choice.

### Weakness

- Cultural taboos
- Low level of Breed up gradation
- Non-availability of Concentrate feed.
- Weak supply chain and marketing facilities
- Meat processing infrastructure
- More labor intensive than other meat industry
- Absence of National Traceability Program

### Opportunities

- Upward demand.
- Business enterprise capital.
- Value adding together and export.
- Medium for poverty mitigation.
- Self-employment.
- Trade with tremendous growth probable.

### Threats

- Meat imports that hinder the development of pig farms.
- Diseases.
- Volatile of agricultural prices (cost and revenue).

- Policies.
- Very vulnerable to world conditions and economical imports.

### Economic advantages:

- Rearing can be started with less capital and less space. In piggery, the cost is refunded quickly (9 - 12 months).
- Dynasty growth is quick and maximum (8 - 12 months). Physical growth 500 - 800 g. / Day.
- Dietary use efficiency (3.5: 1) is high.
- In production there is less expenditure on wages (10 percent).
- It has the amazing ability to convert waste food into precious produce.
- There is a possibility of breed improvement in piggery. Rearing can be done in a small area.
- Pigs convert inedible feeds, forages, certain grain byproducts obtained from mills, meat by products, damaged feeds and garbage into valuable nutritious meat. Most of these feeds are either not edible or not very palatable to human beings
- Pig grows fast and is a prolific breeder, furrowing 10 to 12 piglets at a time. It is capable of producing two litters per year under optimal management conditions
- The carcass return is quite high i.e. 60-80 percent of live body weight
- With a small investment on building and equipment, proper feeding and sound disease control programme the farmer can profitably utilize his time and labour in this subsidiary occupation
- The faces of pigs is used as a manure to maintain soil fertility

Therefore, pig farming can be a better option in India for employment generation, as a contribution to local as well as National economy.







## Foot and Mouth Disease (FMD) in Ruminants



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Foot and mouth disease (FMD) is a severe, highly communicable viral disease of livestock that has a significant economic impact. The disease affects cattle, swine, sheep, goats and other cloven-hoofed ruminants. Intensively reared animals are more susceptible to the disease than traditional breeds. The disease is rarely fatal in adult animals, but there is often high mortality in young animals due to myocarditis or, when the dam is infected by the disease, lack of milk. FMD is characterised by fever and vesicles on the tongue and lips, in the mouth, muzzles, on the teats and between the hooves. The disease causes severe production losses, and while the majority of affected animals recover, the disease often leaves them weakened and debilitated.

The organism which causes FMD is an aphthovirus of the family Picornaviridae. There are 7 serotypes: A, O, C, Asia 1, and SAT (Southern African Territories) 1, 2, and 3, which are endemic

in different countries worldwide. Each strain requires a specific vaccine to provide immunity to a vaccinated animal. FMD is endemic in several parts of Asia and in most of Africa and the Middle East. In Latin America, the majority of countries apply zoning and are recognised as FMD-free, either with or without vaccination.

Australia, New Zealand, Indonesia, Central and North America, and continental Western Europe are currently free of FMD. However, FMD is a transboundary animal disease that can occur sporadically in any typically free area.

### Transmission and spread

Virus is spread through direct contact or aerosolized virus via respiratory secretions, milk, semen, and ingestion of feed from infected animals (meat, offal, milk). In a susceptible population, morbidity reaches 100% with rare fatalities except in young animals.

FMD virus is found in all excretions and secretions from infected animals. Notably, these animals breathe out a large amount of aerosolized virus, which can infect other animals via the respiratory secretions and oral routes. The virus may be present in milk and semen for up to 4 days before the animal shows clinical signs of disease. The virus can also be easily spread indirectly via farm staff and transport vehicles and via animal products



(meat, milk, semen) under specific weather conditions it can also be spread on the wind. Animals that have recovered from infection may sometimes carry the virus and initiate new outbreaks of the disease.

### **Public health risk**

FMD is not readily transmissible to humans and is not a public health risk.

### **Clinical signs**

Strain of virus, the exposure dose, the age and species of animal and the host immunity are the main factors for the severity of clinical signs. Morbidity can reach 100% in susceptible populations. Mortality is generally low in adult animals (1–5%), but higher in young calves, lambs and piglets (20% or higher). The incubation period is 2–14 days. Clinical signs can range from mild or inapparent to severe: they are more severe in cattle and intensively reared pigs than in sheep and goats.

Vesicles (fluid filled blisters) on the tongue, dental pad and hard palate quickly rupture leaving shallow ulceration with shreds of mucosa at the periphery. The underlying tissues are reddened and painful. Ruptured blisters can result in extreme lameness and reluctance to move or eat. Usually, blisters heal within 7 days (sometimes longer), but complications, such as secondary bacterial infection of open blisters, can also occur. Other frequent symptoms are fever, depression, hyper salivation, loss of appetite, weight loss, growth retardation and a drop in milk production, which can persist even after recovery. Chronically affected animals are reported to have an overall reduction of 80% in milk yield. The health of young calves, lambs, and piglets may be compromised by lack of milk if dams are infected.

Death can occur before development of blisters due to a multifocal myocarditis. Myositis may also occur in other sites.

### **Diagnostic**

The disease may be suspected based on clinical signs. However, FMD cannot be differentiated clinically from other vesicular diseases, such as swine vesicular disease, vesicular stomatitis and vesicular exanthema.

A veterinary inspector will attend and the property will be quarantined until FMD has been confirmed or ruled out. It is likely that samples from affected animals will be sent for laboratory testing via PCR or serology.

### **Treatment**

There is no specific treatment for FMD. Antibiotic therapy may be used to control secondary bacterial infection of ulcers but recovery takes several weeks to months. Animals that are confirmed to have FMD will be compulsorily slaughtered (with government compensation). The property (and probably surrounding properties) will be quarantined, inspected and disinfected as necessary. Movement restrictions on remaining animals and animals on surrounding properties will be put in place until they are declared disease free. In some cases, restrictions on re-introducing animals to affected properties may be in place for up to 12 months.

### **Prevention and control**

The two main methods used for control of FMD are vaccination and culling, sometimes in combination. In endemic areas vaccination is the only real option, however the existing vaccines are mostly killed virus vaccines that don't provide cross protection against other virus strains and require frequent booster vaccinations. One of the main problems with the use of vaccines for control of FMD is that the animals will then test positive on many tests for the virus. This is also one of the main limits on the use of vaccines in outbreaks in FMD free countries as international trade generally requires FMD free status and these trade restrictions are one of the biggest impacts of the virus. □







# FLOATING GARDEN



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### Introduction

A floating garden is built using aquatic weeds as a base on which vegetables can be grown. This approach can extend the growing capabilities of rural communities where land would otherwise be unavailable. It is a cheap and sustainable way.

be able to float during that time. To accelerate the process, the previous year's decomposed bed or raft can be used. Floating cultivation can help to mitigate this situation and reduce the pressure on arable lands by turning the flooded and waterlogged areas into productive ones.

Further, floating cultivation does not need any additional water, nutrients, or chemical fertilizers, and the beds can be recycled as organic fertilizer in the newly prepared floating bed and also in the agricultural fields, which is economical as well as environmentally friendly.

As floating beds are mostly made of water hyacinth, a very invasive weed that doubles in area every week or two, they provide a means of using it in a beneficial way, reducing breeding grounds for mosquitoes, lessening the reduction in the carrying capacity of the water body that occurs when the weed breaks down the drainage system, and also having a positive impact on open-water fishing. Because it allows better control over this plant, some researchers have noted the greater productivity of floating bed practices compared with traditional land-based agriculture. This cultivation practice helps to supplement people's income, which contributes towards the alleviation of poverty, and provides greater food security by increasing the landholding capacity of poor as well as landless people by allowing them to grow

### Importance

- Economic benefits
- Food/Nutritional security
- Agricultural benefits
- Ecological/Environmental benefits
- Disaster risk management

### Description of the technique

After collecting water hyacinth, bamboo is laid on a dense layer of water hyacinth to enable people to stand on it, and then more water hyacinth is piled on top to make it compact. The bed must then be left for several days to decompose before it is ready for cultivation. The eventual thickness depends on the duration of water logging, for it must



vegetables and crops with lower input costs, due to the minimal infrastructure required.

### Site selection

One of the most important considerations in aqua gardening is to choose the right spot. Most aquatic plants need plenty of sun, so a site that gets 6-8 hours of direct sun should be chosen. Site should be away from tall shrubs and trees for light availability and to prevent the accumulation of leaf debris.

### Soil characteristics

Lake or pond bottoms containing large amounts of organic matter are the most suitable. Some commercial producers suggest the use of a heavy clay loam or formulated soil for the growth of aquatic plants. If the soil is compacted heavy clay, roots cannot penetrate and harvesting is difficult. Compared plants growing in soil with a pH of 4.6 and water for pH 5.5 to 8.0. An adequate water EC of  $2.0\text{mS cm}^{-1}$  allow grow of plants in Aqua garden 1.0.

### Light

Plant chlorophyll absorbs light at wavelengths of 400 to 700 nm. The intensity of full, natural sunlight is approximately  $2,000\text{ umoles/m}^2/\text{s}$ , or 100k lux, of PAR (Photo synthetically Active Radiation). Light is attenuated rapidly in freshwater, however, so that submerged aquatic plants receive far less than this amount (Hutchinson 1975).

### Selection of plant

Selection depends on the size of the pond and the kind of look desired.

Considerations such as water depth, amount of sunlight and how each species relates to its surroundings need to be taken into account when choosing plant material. Ex. Fairy moss, Hornwort, Water hyacinth and Frog bit

### Preparation of the floating beds

Knowledge of making the floating beds is completely local and indigenous. Paddy stub of local varieties of amon, ans and boro rices were the main material of floating beds until water hyacinth prevails in late 1960s. Since then, the water hyacinth has become the main material for preparation of floating beds. From June to July, the practitioners of the system stack the water hyacinths on water in 24 layers at 8-10 days interval. The first layer acts as the base of the floating bed and maintains the stability, buoyancy and thickness of the bed. Above layers are used as compost. When the stacked plants are partially decomposed, water hyacinth is again put on to the previous stack. Sometimes farmers use semi-decomposed aquatic plants such as water lettuce, duckweed and immature water hyacinth on the top of beds to speed up the decomposition. After 8-10 days of last stacking, farmers sow/transplant seeds/seedlings. General shape of the beds “I” rectangular. There are no fixed rules about the size and shape of the floating beds. They vary from location to location. Lengths of the beds are in the range between 60m and 10m and that of the breadths are between 1.25m and 4.0m. Although it seems effective to cultivate crops on large floating beds, they are usually narrow. That’s because

1. It is easier to operate from the boats and
2. it is easier to move to desired place. The practitioners are occasionally skillful to use bamboo to shape floating beds.

After preparation of the beds, strong wind, storm, cyclone and tidal bore in the coastal areas of the country may drive the beds away or cause damage to the beds with crops. These threats are currently minimized or contained by fixing/anchoring the beds with bamboo poles.

### Cultivation on the floating bed

In this system, seeds are rarely broadcasted directly on the floating beds. They are usually





soaked and then germinate in containers. The practitioners prepare a special structure (locally called Tema) to hold the germinating seeds. Tema is prepared with peat soil or aquatic plants available locally. With the germinating seeds the Tema is wrapped in coconut coir. Seedlings grow in the Tema, and after few days, they are carried for transplantation to each floating beds. Seedlings are then planted in beds together with Tema. One of the important features of floating garden practice is that it shortens crop's life cycle. It takes only from 15 to 25 days from transplantation of Tema to harvesting. For that reason, two or three crop rotation cycles on floating gardens during one monsoon season are common on average in this region. At each cycle, mixed intercropping is the most prevailing system of crop production. Just as the size and shape of floating beds, there are no fixed rules about mixed intercropping. Farmers practice mixed intercropping based on traditional knowledge which has been transmitted from their ancestors. Technologies, especially the crops are adapted to the Dhap system of production and the Dhap system in totality is adapted to the constrained ecological situation of wetland condition and in broader sense to the future impact of climate change.

### Placing Plants in the Pond

Hardy water plant will grow well at water depths of 30-45 cm over the top of the pot. The plant can be placed in the pot at an initial depth of 15cm and then lowered to its final placement or as the plant grows. If the pond is in full sun, the minimum

amount of water over the top of the pot should be from 15-20cm for the plant to grow well. If the pond is in the shade (less than six hours of sun a day) then 15cm of water is sufficient in order for the growing tip to receive enough light.

### Mineral Nutrients

Aquatic plants also have requirements for certain nutrients in the overlying water. Most rooted aquatic plants need Ca, Mg, K and a carbon source in the water if they are to thrive (Barko and Smart 1981).

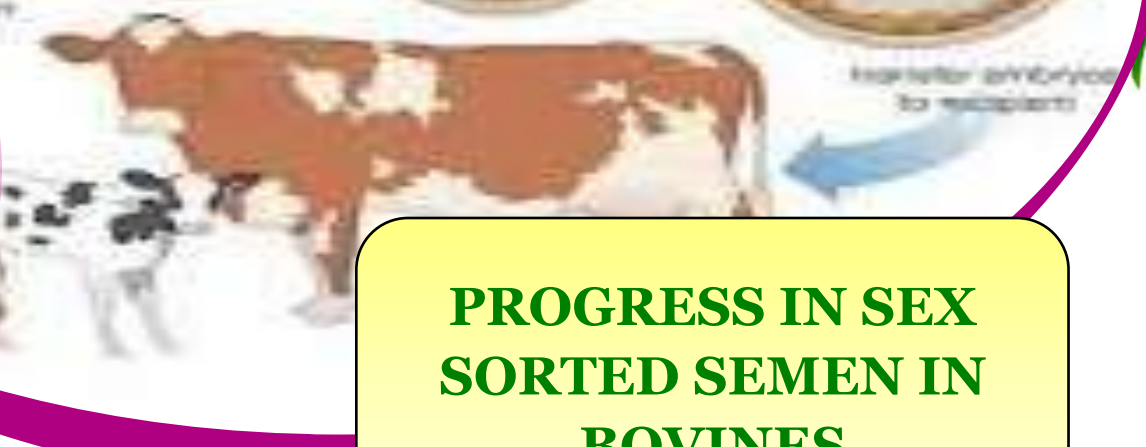
**Table 1: Mineral nutrients (Barko and Smart 1981)**

Nutrient	Nutrients Concentration	
	Pond growth	
	Leaf	Petiole
Nitrogen	2.20	0.80
Phosphorus	0.20	1.89
Potassium	1.16	1.89

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## PROGRESS IN SEX SORTED SEMEN IN BOVINES



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Semen having X or Y bearing sperm to produce progenies of a desired sex either female or male, (about 80-90% accuracy) is known as sex sorted semen. Sex sorting technology was developed by the USDA (United State Development Agriculture) researchers in Livermore, California and Beltsville, Maryland. This “Beltsville Sperm sexing technology” was a patented technology. The commercialization of sex sorted semen started in United State in 2001 with a license granted to sexing technologies (ST), Texas. At present, ABS and ST commercially produce sex sorted semen in many countries in many countries of Europe, USA, Canada, Mexico, Brazil, China, Japan etc.

### Historical development in sexed semen production

S.No.	Technology of semen sorting	Year
1.	Sperm DNA content by analytical flow cytometer	Gledhill <i>et al.</i> , 1976

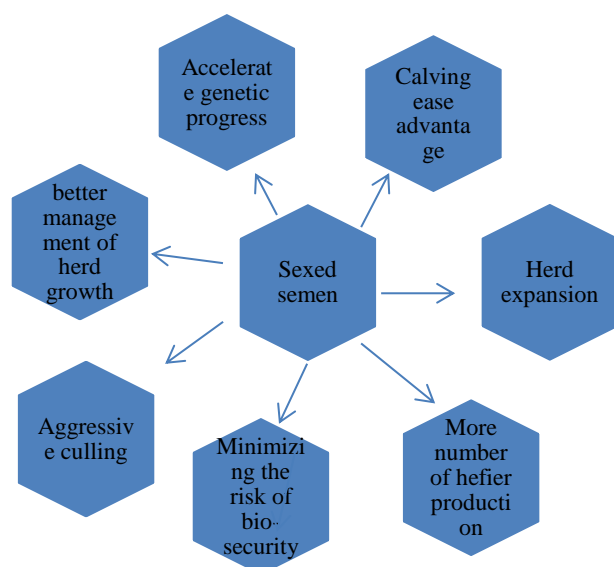
### BOVINE

2.	Orientation of sperm	Dean <i>et al.</i> , 1979
3.	Bimodal DNA peaks	Pinkelet <i>et al.</i> , 1982
4.	Modification of sorter	Johnson <i>et al.</i> , 1986
5.	Sorting of sperm heads	Johnson <i>et al.</i> , 1987
6.	First use of sex sorted semen in IVF	Cranet <i>et al.</i> , 1993
7.	High speed flow-cytometers and sex semen	Renset <i>et al.</i> , 1998
8.	Successful freezing of sex sorted semen	Schanket <i>et al.</i> , 1999
9.	Sexing Technologies	2002
10.	Decisive program by Monsanto (Digital Electronics)	2005
11.	Micro fluidics program by CytonomeST	2010
12.	Full automation by CytonomeST	2012
13.	Sexed Ultra™	2014
14.	First use of sex sorted semen in IVF	Cranet <i>et al.</i> , 1993





## Why Sexed Semen in Dairy Cattle Production



## How Sexed Semen is produced?

### ❑ Conventional Techniques

- Density Gradient centrifugation method
- Swim Up technique
- Free- Flow Electrophoresis
- Surface Antigenic Differences
- Volumetric Differences

### ❑ Other Techniques

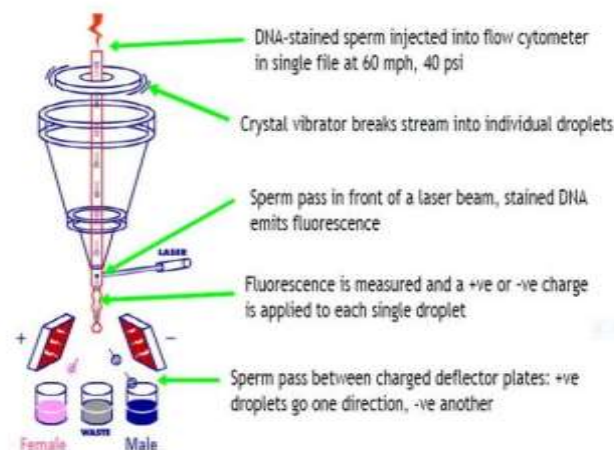
- Raman Spectroscopy
- Sperm Chromatin Dispersion Test

### ❑ Flow Cytometry

Sperm are sorted by due to find differences between the X- and Y- bearing sperm. The X-chromosome bearing sperm contains about 3.8% more DNA in comparison to the Y-chromosome in cattle. This quantities difference in DNA content is used to sort the X- from the Y- bearing sperm. Among various techniques of semen sexing, flow-cytometry based sorting has emerged as most efficient and successful technique. This technology is refined through the decades and finally sex sorting is possible with the purity of more than 90%. This technique is good standardized, patented and commercialized in USA, Europe and other countries.

## Sexed semen – the technology

'Female' sperm contain ~ 4% more DNA than 'male' sperm



## Is it safe?

Yes, sex sorted semen is safe to be used for artificial insemination. However, as sperm concentration in sexed semen straw is far less (2.1 million/ straw) than the conventional semen straw and the sorting procedure itself damages the sexed sperm, it is reported that the conception rate is 10 to 15 % less with sexed sorted semen in comparison to conventional semen.

## What are the advantages of using sexed sorted semen?

- Producing only female calves helps the farmers to conserved resources that would have been shared with unwanted males.
- Production of more female calves: increase supply of replacement heifers
- Opportunity to sell surplus heifers to other farmers/farms
- Speed up genetic improvement of animal.
  - By enhancing efficiency of progeny testing (PT) programme
  - By enhancing efficiency of embryo transfer technology and IVF programme
- An economic way to increase herd population with no risk of introducing diseases by



purchasing heifers from outside (improves bio-security).

- As dead, dying or damaged sperm cells are removed at the time of sorting process, only live sperm are available which helps the sexed semen to be successful even at a low concentration (than conventional semen).
- By producing more female calves using sexed sorted semen, there will be less difficulty at the time of births compared to male calves (dystocia). This is particularly important for maiden heifers.

### **What are the limitations of using sexed semen?**

There are many limitations in terms of technology and implementation aspects of the sexed sorted semen.

#### **Sexed semen technological limitations**

- High cost of sex sorting machine
- Low sorting efficiency and speed
- Require highly skilled person to operate sex sorting machines
- Damage to the sperm due to shear force, electrostatic charge, droplet formation and sudden stop.
- Waste of approximately 50% of sperm
- Reduced freezing potential of the sorted sperm

#### **Implementation limitations**

- High cost of the product which include the cost of the intellectual property right (Rs. 1500-4500/- dose as compared to Rs. 20-30/- dose for conventional semen)
- The conception rate of artificial insemination done with sex sorted semen is 10-15% less than the conventional semen. This factor will be more critical in Indian condition due to low artificial insemination coverage (20-25%) and low conception rate with artificial insemination (25-35%).

- There is no standard operating procedure to perform insemination with sexed semen. This is another area of concern as the sperm concentration of sexed sorted semen ranges between 2 and 4 million/dose whereas it is 20 million/dose in conventional semen. Managing lower sexed sorted sperm concentration in straws will be a challenge in the field under Indian condition.

### **Is it available in India?**

Currently ABS and ST are producing sexed semen in India

- As per the Government data, India has a bovine population of 300 million of which only 85 million provide milk in the country while the rest are unproductive animals, including 84 million males.
- Solution to this problem was to promote sex semen sorting techniques to increase female population and make milk production more remunerative to farmers engaged in dairying.
- The Government has also tasked the Indian Council of Agriculture Research (ICAR) with coming up with the technique by 2018 for indigenous cow breeds since the US companies gives sex sorting technology primarily for exotic cattle breeds such as Holstein Friesian and Jersey.
- Government of India is pursuing Rs 594-crore project to introduce sex sorted semen production technology through machines at 10 semen stations in the country and produce sex-sorted semen.
- The aim is to produce six million "genetically improved" female bovines every year. The Centre has given fund Rs 200 crore for installing the machines and Rs 275 crore for the cost of sex-sorted semen production.







# Important external feeders of stored grains and their management



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## Introduction

They feed on surface of the grains & their products externally e.g. Red flour beetles, Indian meal moth, khapra beetle etc. The major economic loss by grain infesting insects is not always the actual material they consume, but also the amount contaminated by

them and their excreta which make food unfit for human consumption. In India, post-harvest losses caused by unscientific storage, insects, rodents, microorganisms etc., account for about 10 per cent of total food grains produced. A number of insect pests gain access to the grain storage at various stages of processing of food grains/ seeds viz., during the process of development and maturation of seeds/ grains, processing in threshing yards, during transit or while in storage. Some insect pests initiate damage at the ripening stage of crops and continue during storage.

### 1. Red flour beetles, *Tribolium castaneum* & *T. confusum* (Coleoptera: Tenebrionidae)

- Grubs & adults feed on 'broken grains, oil cakes, dried fruits, nuts & processed food materials like flours, peanuts, cocoa beans etc.,

- It release gaseous 'quinine' which produces 'acidic odour' in heavy infestations.



*Tribolium castaneum*

### 2. Khapra beetle, *Trogoderma granarium* (Coleoptera: Dermistidae)

- Grub 'feeds on seed coat in an irregular manner' in 'all cereals', but serious on 'wheat'.
- It also attacks 'dried fruits, oil cakes, animal products like wool, skin etc.



Khapra beetle

### 3. Saw-toothed grain beetle, *Oryzaephilus surinamensis* (Coleoptera: Silvanidae)

- Grubs & adults feed on 'grains, dried fruits, oil cakes etc., by scrapping on the surface irregularly & 'left over materials of primary feeders'.



Occurs as 'secondary feeder'  
Saw-toothed grain beetle



**4. Long headed flour beetle, *Latheticus oryzae* (Coleoptera: Tenebrionidae)**

- Also occurs as 'secondary feeder' on stored rice, sorghum, wheat *etc.*



Long headed flour beetle

**5. Rice moth, *Aphomia cephalonica* (Lepidoptera : Pyralidae)**

- Larva 'webs the broken grains together & feed within', & also attacks 'flour' especially 'milled products of jowar, rice, maize, oilcake, dried fruits' *etc.*



Rice moth

**6. Indian meal moth, *Plodia interpunctella* (Lepidoptera : Pyralidae)**

- Larva makes 'dense webbing' on the surface of 'broken grains' or 'on the milled products' or 'on the dried fruits, sweets' *etc.*, by feeding.



Indian meal moth

**7. Fig moth or almond moth, *Cadra cautella* (Lepidoptera: Pyralidae)**

- Larva 'webs the broken grains or milled products or spices, pulses, oilseeds, coffee beans *etc.*, together with silk & silk



Fig moth or almond moth

strands on the surface of the commodity, & feeds within'.

**8. Mediterranean flour moth, *Ephestia kuehniella* (Lepidoptera: Pyralidae)**

- Larva attacks 'flour & broken grains' similar to rice moth



Mediterranean flour moth

**9. Cocoa moth, *Ephestia elutella* (Lepidoptera: Pyralidae)**

- Larva attacks cocoa, chocolate, tobacco leaves *etc.*



Cocoa moth

**Management of external stored grain pests**

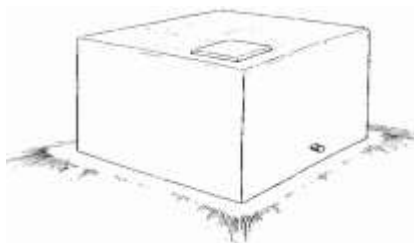
**1. Preventive measures**

- Reduce the moisture content in the grains / seeds by < 10% before storage.
- Maintain hygiene in the store house by plugging the cracks, crevices & holes in the warehouse.
- Remove all the debris & clean the store house before storage.
- Disinfect empty warehouse or containers by spraying malathion 50 EC @ 10 ml/l or DDVP 76EC @ 7ml /l of water -use 3 liters of solution / 100m<sup>3</sup> area
- Maintain good storage condition by providing dunnage & leave gangways (0.75 -1m space) all round.
- If seeds are meant for seed purpose Coat the pulse seeds with 'edible oils' or 'castor oil' or 'neem oil' @ 5ml / kg seeds.
- Mix the seeds with dried neem leaves *Acorus calamus* powder @ 10g / kg seeds Malathion 5% @ 250g / q of seeds.
- Store the seeds / grains in a insect proof bins like PUSA bin, metal bin, aluminium bin, plastic bin *etc.*



- Store the seeds / grains in a insect proof bags.

### Insect proof bin's / bag's



PUSA bin



HDPE bags with lamination inside



Grain pro bag

## 2. Curative measures

- Regular inspection of godown – if infested, dry it under sun regularly.



### Zerofly bag

- If infestation is severe, go for fumigation in godown with
- Aluminium phosphide tablets @ 3 tablets / ton of grains / seeds or 10g pouch / ton of grains / seeds or 150gm/100m<sup>3</sup> area with a exposure period of 5 -7 days.
- It releases phosphine gas, ideal for large scale fumigation in warehouses, godowns.
- Alteration of carbon dioxide & oxygen levels in the storage / godown.

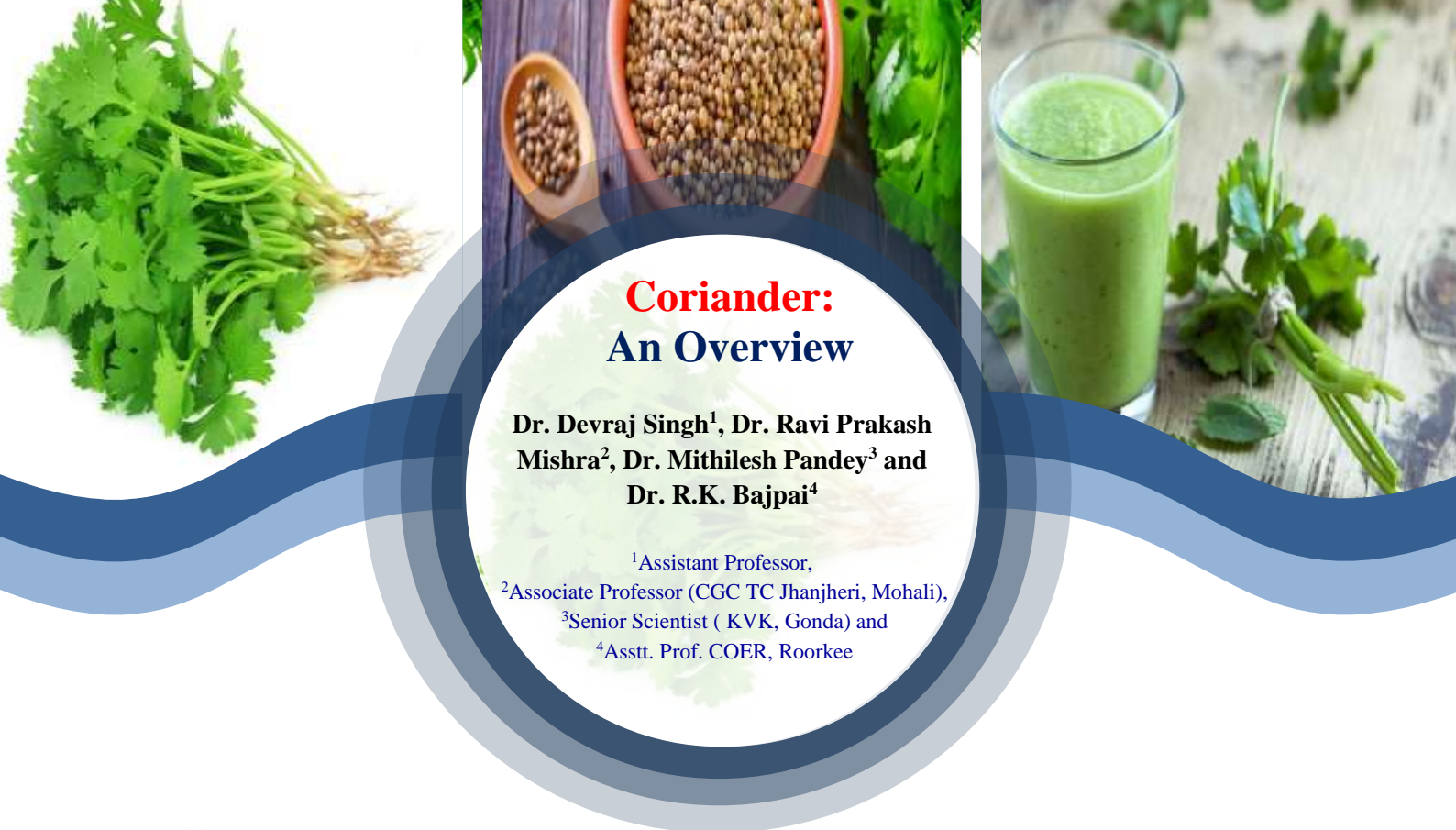
## Conclusion

External feeders are apparent by their presence. The internal feeders are very often perceptible only after a appreciable damage is caused. Understanding the evidence of damage, lifecycle and biology of major stored product insect pests would help in supervise and estimation of their damage so as to devise suitable strategies for controlling these pests.

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## Coriander: An Overview

**Dr. Devraj Singh<sup>1</sup>, Dr. Ravi Prakash Mishra<sup>2</sup>, Dr. Mithilesh Pandey<sup>3</sup> and Dr. R.K. Bajpai<sup>4</sup>**

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“Historically, India has always been recognized as a "Home of Spices" in which the seed spices constitute an important group of agricultural commodities and play a significant role in national economy. It was lure of these spices that brought many seafarers to the shore of India. India is the largest producer, consumer and exporter of spices in the world, where 63 kinds of spices are grown (Pruthi, 1998). Mainly 52 spices are grown in India according to Spices Board, Calicut, Kerala. Coriander is one of the important seed spices crop grown throughout the world.”

### Introduction

Coriander is generally known as “Dhania” but some other countries it is also known as Cilantro (leaves), Coriandro (fruits) in Spanish, Coriandre in French and Catalan, Coentro in Portuguese, Martorria in Euskara, Coriandolo in Italian, Koriander in German, Dutch and Coandro or Coriandro in Galego.

Coriander is botanically known as *Coriandrum sativum* L.,  $2n=2x=22$ , is an annual herb belongs to the family Apiaceae. It is originated in Mediterranean region. In India it is mainly cultivated in Rajasthan, Gujarat, Andhra Pradesh, Madhya Pradesh, Tamil Nadu and Uttar Pradesh etc. The states Rajasthan and Gujarat have emerged as "Seed Spices Bowl" and together contribute more than 80 percent of total seed spices production in the country. In India it

covers 0.58 Mha area with 0.55 Mt production with their 0.95 tonnes per hectare productivity (Anonymous, 2015).

Coriander plant is a smooth, erect, annual herb, 30-90 cm high, with conspicuously enlarged nodes and hollow internodes. The stems are vertically ridged. The leaves are pinnately compound and often decompound. The lower leaves are broad with serenely-lobed margins. The upper leaves are finely cut with linear lobes. The petiole is often swollen even, hollow at the base and sheathing the stem. The leaf arrangement is alternate. The plant comes to the flowering stage in about 45-60 days after sowing. The flowers are small, white or pinkish in compound terminal umbels. There are 5 sepals, 5 petals, 5 stamens and two carpels which are free with an epigynous ovary. The fruit of coriander is schizocarp, globular, yellow in colour with





brown ribs. The size of seed is about 3.0 mm in diameter and ripe seed are aromatic. At dehiscence, the carpel called pericarp separate, each containing a single seed with a copious endosperm and a minute embryo.

Coriander is a great source of potassium, iron, vitamin A, K and C folic acid, magnesium and calcium. Therefore, it is known all over the world for its medicinal properties. The coriander is famous for its two primary products. First for flavoring and next for green leaves, which are used in chutneys, sauce, curry and other preparations because of its pleasant aroma. The coriander seeds are used as spices in the preparation of curry powder and pickling spices. Dry seed contains 0.1-1.0 percent essential oil linalool used in food Industries. They are used for flavoringpastry, cookies-cakes, bakery products, meat, fish, soda, and syrups, candy preserves and liquor.

Nutrient	Amount (per 100 g)	
	Coriander leaf	Coriander seed
Water	7.30 g	8.86 g
Energy	279 kcal	298 kcal
Protein	21.93 g	12.37 g
Total lipid (fat)	4.78 g	17.77 g
Carbohydrate	52.10 g	54.99 g
Fiber, total dietary	10.40 g	41.9 g
Calcium	1246 mg	709 mg

Iron	42.46 mg	16.32 mg
Magnesium	694 mg	330 mg
Phosphorus	481 mg	409 mg
Potassium	4466 mg	1267 mg
Sodium	211 mg	35 mg
Zinc	4.72 mg	4.70 mg
Vitamin C	566.7 mg	21.0 mg
Thiamin	1.252 mg	0.239 mg
Riboflavin	1.500 mg	0.290 mg
Niacin	10.707 mg	2.130 mg
Vitamin A	5850 IU	0.00 µg
Vitamin B	12 0.00 µg	0 IU
Fatty acids, (total saturated)	0.115 g	0.990 g
Cholesterol	0.00 mg	0 mg

Besides, coriander has profound medicinal values too. The seeds are chewed to correct foul breath. It is also considered to lessen the intoxicating effect of liquor. An infusion of seeds in combination with caraway and cardamom seeds are useful in flatulence indigestion, vomiting and intestinal disorder (Purthi, 1998). The oil extracted from coriander seeds, is useful chiefly as a flavouring agent for liquor cocoa and chocolate industries. It is also employed in medicines as carminative or as a flavouring agent to cover the taste or correct the gripping qualities of other medicines. Oil is also used in perfumes. Indian spices and condiments have made significant export market in the world-trade.





## **SNAKE ENVENOMATION IN THE CATTLE**

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There are nearly 216 species of snakes found in India in which 60 are considered poisonous. The most poisonous and medically important species of snakes distributed throughout India, about one lakh animals died in the world to venomous snake bite every year. In India, snake bite is a common and important cause of accidental death in animals. Most of the fatalities are due to the victim not reaching the hospital in time where definite treatment can be administered because community is also not well aware about the occupational risks and simple measures which can prevent the death from the snake bite. Peoples continue to adopt harmful first-aid practices, such as tourniquets, cutting, and suction of blood from the biting site. Snake bite is common in animals such as cattle, sheep, goat etc. Commonly cases of snake bite occur during grazing period and monsoon season. Common site of snake bite are tongue, muzzle, tail and limbs. It primarily affects poor agricultural workers, farmers, and poor cattle herders living in rural area of developing countries. In India this is very common cause of death in animals especially in rural areas.

### **Clinical signs**

- Fang Mark present at the biting site (absent in the case of non-poisonous snake)
- Swelling seen at the biting area

- Epistaxis ( bleeding from nose )
- Dilatation of pupils in affected animal
- Frothy salivation
- Paralysis
- Swallowing paralysis
- Muscular weakness
- Necrosis
- Respiratory distress
- Incoordination
- Pale conjunctival mucous membrane

### **Diagnosis**

#### **20-Whole Blood Clotting Test (20WBCT)**

It is a simple, informative bedside test requiring only a new, clean, dry, ordinary glass tube, bottle, vial, or syringe. Collect the blood from jugular vein of the cattle; pour it into the glass tube. Wait for 20 mins, if the blood is not clot that indicate snake venom present in the blood, and check it every hours.

### **Line of treatment**

Antivenom should be ideally administered within 4 h of the bite, but it is effective even if given within 24 hr.





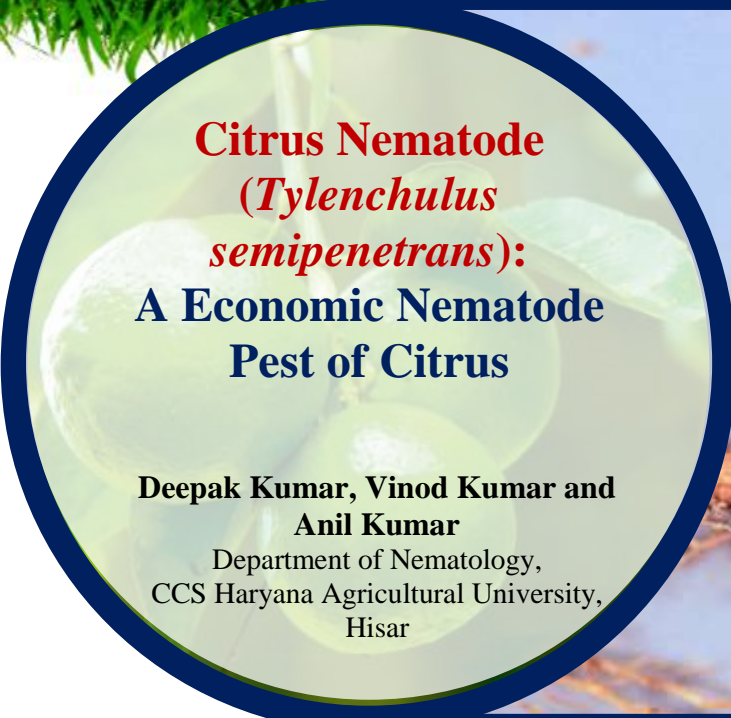
- Give Snake Venom Antiserum (20ml) two vial mixed with Normal Saline/DNS. After 6 hours check the WBCT, if blood is not clot, again go for second dose of snake venom antiserum.
- Give Tetanus Toxoid- 0.5 ml I/M
- Metronidazole ( give for gram negative bacteria )- I/V
- Streptopenicillin ( 10,000- 60,000 IU )- give I/M

- Furosemide- 0.5-4mg/kg I/M

### **Contraindication**

Avoid administration of Chlorpheniramine maleate because it causes synergistic reaction of snake venom.





## **Citrus Nematode (*Tylenchulus* *semipenetrans*): A Economic Nematode Pest of Citrus**

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Citrus is very important fruit crop grown throughout the tropical and subtropical areas of the world. In India, it ranks third after mango and banana among the fruit crops. Over 200 species of plant-parasitic nematodes (PPNs) belonging to more than 58 genera have been detected on citrus roots worldwide. Out of these, approximately 122 species belonging to 57 genera are reported from India. Most important is citrus nematode, *Tylenchulus semipenetrans*. *T. semipenetrans* is a very destructive species among PPNs and causes slow decline disease in citrus. Its feeding strategy is semi-endoparasitic and has a very narrow host range among commonly grown crops. It is dominating in most citrus production areas and also under diverse soil textures worldwide. In India, it is widely distributed in citrus orchards grown in Andhra Pradesh, Assam, Himachal Pradesh, Haryana, Punjab, Rajasthan, U.P., M.P., Bihar, Gujarat and Maharashtra. This nematode can cause 10-30% losses reported on citrus trees. They also parasitize other hosts such as olive, grape, persimmon and lilac.

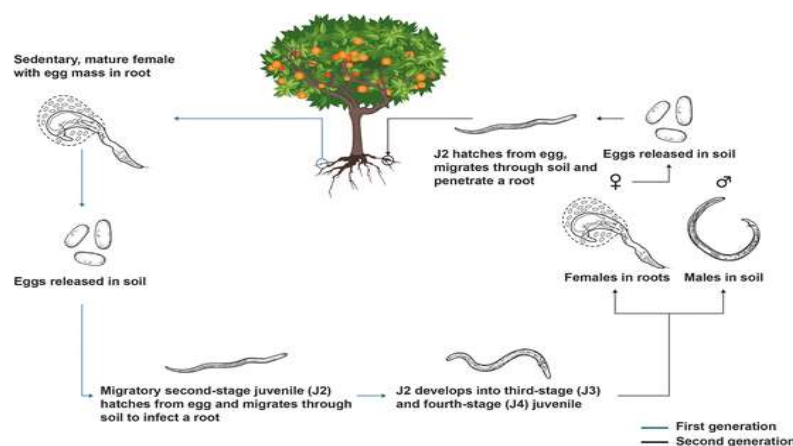
### **Life cycle and reproduction**

The female nematode completes its one life cycle in 6-8 weeks whereas the male only lives for about

7-10 days (Fig. A). Reproduction is generally by amphimixis and parthenogenesis. The first-stage juvenile (J1) remains inside the egg and second-stage juvenile (J2) hatch out from the eggs. The sex determination can be distinguished at J2 stage. The J2 male has a stylet while the J3 and J4 have a weaker stylet. The male nematode is required for reproduction with female when their posterior end is exposed on the root surface. The female juveniles begin feeding ectoparasitically on epidermal root cells. It is not until the female nematode becomes a young adult that she becomes the infective stage. The anterior end of the young female penetrates into the cortex of the root and begins feeding on 3-6 nurse cells. This intense feeding by the adult female will cause the posterior end to enlarge outside the root and start producing eggs. After fertilization, the female lays its eggs outside of the root in a gelatinous matrix extruded from excretory pore located near the vulva. Hatch, feeding, growth, and reproduction are limited between 68 and 86 °F. Second-stage juveniles are the persistent stage that can survive for a year or more in field soil.







**Fig. A. Complete life cycle of citrus nematode**

## Transmission

The citrus nematode moves very slowly through the soil so need an active source of transmission.

- ✚ Dissemination of nematodes mostly happens due to infested nursery stock from infested nurseries where the nematode was spread from tree to tree by flood irrigation.
- ✚ Use of infested equipments in orchards during intercultural operations may result into arrival of nematodes.

## Host-parasite interaction

High population densities of the citrus nematode can result in severe damage on the citrus tree. Some above ground symptoms can be observed such as suppression of citrus tree growth, lack of vigor or decline symptoms, yellowing of foliage and small size of fruit. The young adult females penetrate into the cortex cells, become sedentary and form multiple 'nurse' cells. The nematode feeding from these nurse cells reduces the amount of water and nutrients available to the growing plant.

For below ground symptoms, the infected roots are thicker, darker, decayed and appear dirty. This is caused by soil particles sticking the gelatinous matrices which have been excreted by the females. The infected root systems due to the nematode damage lose the ability to absorb enough water and nutrients for normal growth. Yellowing of foliage, leaf curling and dieback are

consequences of insufficient root development and decayed young roots.

## Management of the citrus nematode

Management practices consist of exclusion, preventive measures and post-planting treatment applications.

✚ All growers should avoid contaminated nursery rootstocks and use nematode-free soil and certified nematode-free rootstock (it is obligatory in some areas).

- ✚ Nematodes can easily be removed from seedlings by dipping the roots in 45 °C water for 25 min; this kills the nematodes but does not harm the plant.
- ✚ For cultural practices, the container/polybags and soil used for citrus growing can be treated with steam and soil solarization, respectively.
- ✚ Resistant rootstocks (Example-Trifoliata) are available which is the most useful strategy to suppress nematode population density. Recently, the hybrid rootstock called 'Swingle citrumelo' (*Citrus paradisi* x *P. trifoliata*) is highly resistant to the citrus nematode.
- ✚ Fumigation and nematicides are used to reduce initial population densities. Halogenated hydrocarbons (MBr,1-3-D and chloropicrin) are the most effective.

## Recommendation by CCS HAU, Hisar

- ✚ Application of Carbofuran 3G @13g/sq.m. (About 9 sq.m. around plant) just before flowering, pulverize the soil in the basin area and mix the chemical thoroughly followed by irrigation.
- ✚ Application of Carbofuran 3G @7g/ sq. m + 1 kg neem cake (about 9 sq.m. around plant) just before flowering, pulverize the soil in the basin area and mix the chemical thoroughly followed by irrigation.

□□□



# MODERN CULTIVATION OF FIG

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## Introduction

Fig was an important food crop for the Eastern Mediterranean region's ancient civilization. It is a fruit that is extremely nutritious, prized both as fresh fruit and in a dried state. There is a laxative property of the fruit. Afghanistan, Greece, Iraq, Syria, Spain, Portugal etc., are the key countries developing figs.

## Climatic and soil requirements

The fig is a subtropical fruit with an optimum temperature of 15.5 to 21°C for good growth. Buds from most cultivars need some chilling in the winter. In mild tropical and subtropical regions, figs exhibit continuous growth without a distinct rest time. The tree, however, normally has a semi-deciduous habit and during October-January it goes into mild dormancy. Fruit characteristics have also been affected by climate. The best quality figs are produced by a dry climate with temperature, particularly at the time of fruit growth and maturation. High temperatures such as 35 to 38°C can result in fruit ripening prematurely. Likewise, very low temperatures can result in fruit splitting and poor quality. Figs can be grown on all forms of soil. The deep, clay-loams, however, are better suited. Well drained alluvial clay loams or medium black soils are also good for fig cultivation. The fig is one of the most drought tolerant crops. It can tolerate sulphate and chloride salts. Soils having a high lime content produce fruits of better quality

suitable for drying. But even a small amount of sodium carbonate in soil is injurious to fig. Major portion of the root system is distributed within 50-60 cm depth and hence the fig can also be grown in shallow soils of 2 feet where other fruit trees cannot be accommodated.

## Types and cultivars

The figs are classified into four types based on the nature of flowers and the methods of pollination.

### Common Fig

These new varieties when grown on 'Brown Turkey' root stock (through chip budding) hold great promise for exploiting marginal lands in arid and semiarid regions.

### Capri fig

Short styled pistillate and functional staminate flowers are available for this type. Most caprifigs are not edible, but are grown because they contain a small wasp viz. *Blastophaga psenes*, which is needed by transferring the pollen grains from caprifig for pollination and fruit set in other forms such as Smyrna fig. Smyrna fig: It's the most significant one commercially. However, the fruits develop only when the flowers are pollinated with pollen from the male flowers of the caprifig transmitted by the *Blastophaga* wasp. Calimyrna is the common cultivar of this type.

### Sanpedro fig

In this type, the first crop is completely parthenocarpic, but the second crop develops only if the flowers are pollinated. The common cultivars of this type are Sanpedro, King and Gentile. In India, common fig is mostly grown. Some of the cultivars





grown are Black Itchier, Brown Turkey, Turkish White, Kabul and Marseilles. Yercaud Timla fig is a drought tolerant cultivar. Fruit are large and reddish purple in colour.

### **Fruit set**

The occurrence of parthenocarpy has been observed even in the common fig or Adriatic fig, altered by the climatic condition of a specific area. Therefore there is a risk of fruit set failure in a specific location by a specific variety. By spraying 25 ppm of NAA or IBA on the flowers, the parthenocarpic fruit set can be enhanced. For Smyrna figs, for an efficient fruit collection, inter-planting of Capri figs should be performed.

### **Propagation and plantings**

Rooting of hard wood cuttings is the common method of propagation in fig. Rooting was the best in cuttings from 3 year old wood with 30-40 cm length and 1.5 cm dia. Cuttings from the base of the shoot and lower part of crown have to be used as they root better. Cuttings are taken during January-February at the time of pruning in North India whereas, the cuttings are taken during rainy season in South India. By air layering, shield or patch budding, and side grafting, Fig can also be propagated. Rootstock concentrate glomeration provides resistance to nematode root knot resistance. A separation of 5-7 M is recommended for optimum yield, depending on the fertility status of the soil. The planting season varies from place to place: South India, August-September, June-July, North India, January-February, Western India.

### **Post cultivation**

The fig trees are conditioned to a desired height and form in order to keep the trees more efficient and to promote inter-cultivation operations. In a year, the fig tree bears two crops, the first crop of the previous season on wood and the second crop of the current season on fresh wood. To induce flower-bearing wood growth, pruning is required. The pruning time and quantity are modified in accordance with the growth habit and bearing capacity of the tree. Notching stimulates production of laterals on vigorous upright branches

### **Nutrition and irrigation**

The fig reacts well to manure. It is possible to suggest a quantity of 20kg FYM, 500-600g N and 350-400g P<sub>2</sub>O<sub>5</sub> per tree per year. Since it is a crop resistant to drought, it is mainly grown as a rainfed crop. Irrigation helps, however, to increase the yield. The crop can be irrigated once every 10-12 days during the season. Frequent irrigation with excess soil moisture can contribute to fruit splitting. It should be borne in mind that during fruit ripening, the plants should not be given any irrigation because it will result in insipid fruits viz., fruits with bland taste.

### **Plant protections**

#### **Insect pests:**


Leaf feeders: *Glyphodes* sp. *Hypsa ficus* *Phycodes radiata* Borers: *Olenecamptus bilobus* Thrips: *Gigantothrips elegans*. Fig Fly (*Lonchaea aristella*) If warranted, these pests can be controlled by spraying endosulfan @ 2.5ml/lit. Which is safer to *Blastophaga* especially when the caprifigs are interplanted for pollination.

**Diseases:** Rust: It is caused by *Cerotolium fici* Small, round brownish to black eruptive lesions occur on the leaves. The rust causes heavy defoliation of leaves. It can be controlled by dusting with sulphur.

### **Harvest and storage**

The fruits should be picked when they are soft and wilt at the neck. If the fruits are picked before proper maturity, milky latex exudes. Fresh figs are highly perishable. Slightly immature fruits are to be harvested for transporting to distant markets. Ripe fruits are picked either from the tree by twisting the neck at the stem end or by cutting it or gathered after they drop. The harvesting season is mid February to June. Yield ranges from 180 to 360 fruits per tree. With 90 percent relative humidity, fully ripe fresh figs can only be kept at 0°C for about a week. The fig fruits are first soaked for half a minute in boiling saltwater and subjected to sundrying for a few hours in order to maintain them in a dried state. They are then dried for 8 days under shade and stored in polythene containers. Drying in an electric drier at 70-72°C with prior sulphur fumigation is another aspect of fig preservation. □





# MUSHROOM CULTIVATION TECHNIQUES

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Mushroom is a fungi which is in high demand now a days. Mushroom is low in calories, free from cholesterol and fat and contain fibers and minerals in it. It also contain protein and antioxidants in it. Mushroom farming and cultivation is most profitable agri -business that we can start with low investment and in low area also. From mushroom cultivation, many farmers in India are making high income and also giving employment to various peoples. Mushroom cultivation techniques comes under fungi culture as mushroom is a spore bearing, fleshy fruiting body of a fungi. Cultivation of this fungi which is rich in vitamin B, reduces body fat and also rich in amino acids has begun around 4 decennary ago in India in comparison to European countries (since 17<sup>th</sup> century).

Earlier, it's production was done only in the winter season but now with emerging new technology, it can be grown round of the year in any month. Mushroom farming can be commercial, successful and money making for the farmers if it is done in correct order.

Apart from this button mushroom we have many other varieties of mushrooms like oyster, cremini, porchini etc.

Indian farms mostly like to grow the button mushroom (*Agaricus bisporus*). Vegetative part of button mushroom fungus is contained many interwoven filaments inside it. By the help of some points we will understand the farming of Button mushroom below.

## **Making of Button mushroom**

### **Climatic requirements and low tech mushrooms rooms:**

Mushrooms are grown in well shaded mushroom huts in which environment is maintained. Nitrogen concentration should be checked although some mushroom doesn't like high concentration of nitrogen Mushroom cultivation 21-27degree C for vegetative growth and 11-18-degree C for growth in reproductive phase





i.e., for developing a fruit body. Relative humidity should be around 78-90% and ventilation during cropping is also needed. A low tech mushroom farm is also made. Mostly indoor spaces such as rooms maybe the best way to make low tech houses. Also shade houses are made for mushroom cultivation made of bamboo sticks and straw grasses. In a small scale mushroom we can grow 10 kg of mushrooms in an area of 10meter square by doing 12 hours of work. Once u got the idea of where you have to make your small mushroom farm, you can start thinking what your farm looks like and it's the good time to design your small farm. There are huge ways of designing your mushroom farm setup depending upon the space you have. The mixing and incubation rooms are made simple. And once you have decided your design then it's the correct time to build it. Low tech mushroom cultivation techniques are used by the farmers from last few years ago which does not require a huge, costly equipment. Other features of low tech approach is quick growing strains. Below are the images of a low cost shade house which was made by a mushroom farmer name Kiran Devi in Tanakpur city of state Uttarakhand. She used the bamboo sticks, woods and straw for making low cost mushroom houses. She was cultivating mushrooms in the bamboo houses from more than 6 years and giving employment to various villagers in her village.



### **Cultivation process-**

Following are the steps-

1. Mushroom spawn production
2. Preparation of compost
3. Spawning
4. Cropping and Harvesting
5. Post harvest Management

By following points understand this process step by step-

#### **1. Mushroom spawn production**

In the steps of spawn production, the wheat grains are boiled in double jacketed stem kettle for around half an hour. Then these boiled grains are send for drying in the air for few minutes. Chemicals like  $\text{CaCO}_3$  and gypsum are mixed with the grains of the wheat. Grains of the wheat are then packed in the poly bags of around 1kg air tightly. These bags are then send to autoclave machines and autoclaved for 3hrs in 16 bar pressure. For mushroom cultivation, mycelium from mushroom breed is put down into well sterilized steam grain and when the mycelium starts totally growing from the grain then this mixture of mycelium and grain is commonly called spawn which is also known as seed of mushroom. Now this spawn is separated and dispatched for further steps of composting process. We can produce spawns in the labs or we can also purchase them from various agriculture and horticulture universities.





## 2. Preparation of compost

For preparing compost mixing of mustard husk, chicken manure, urea and gypsum and water. These mixture is mixed in the bins having small holes in the bottom. These small holes helps in maintaining the temperature of 80 degree C .it is kept their for 11 days. After 11 days he bin filling is them shifted to pasteurized tunnels. Pasteurization is done to release excess of ammonia. The compost is kept here for an interval of 7-8 days and after 8 days compost is ready. After this spawning is done in the compost. Compost is an artificially prepared means for the growth of spawn. This mixture is made by adding plant wastes, salts, other supplements and water. Below are the images of Hitesh pant and Rohit Upreti making compost for mushroom cultivation in Rural Horticulture Awareness Programme.



## Short method

Compost make ready by this method is suitable for the mushroom production giving high yield and require more resources and capital and provide best quality of mushroom with less possibility of infection. In First step of process of composting i.e., Outdoor composting, Wheat straw or paddy straw is mixed with chicken manure and then water is mixed. We can start first turning on day 4 and create a 5 feet high heap. We can start second turning on day 7 and put on wheat bran, urea and gypsum and mix thoroughly and keep up the compost inside mixture 70-75-degree C. Then we can proceed third turning on day 8 day and then on day 10, we can move the compost into pasteurization tunnel and here our Second phase of composting is started, i.e., Indoor Composting, the compost manufactured needs to be pasteurised to kill unwanted microorganisms and to change microbial protein from ammonia. This whole process is carried out step by step in a steaming tunnel where the temperature of air is maintained at 60-degree C for around 3- 4 hours. And at last, the compost acquire must have 7.5 pH with 70% moisture content and free from insects. When whole process is completed then compost is cooled down to 25-degree C.

## Long method

This method of composting is only used when there is no steam pasteurization unit facility. In this method, we will first turned on 6 day and second turning is given on day 10 and third turning on day 13 and gypsum is also added. Fourth, fifth and sixth turnings are given on day 16, 19 and 22 and seventh turning on day 25 along with addition of 10% BHC (125 g) and then final turning on day 28 and compost is smoked to check the smell of ammonia, if the smell is present, then leave for 3 days and flip and check again, and when the smell of ammonia is not present, compost is ready for spawning.







### 3. Spawning

In the process of spawning, Spawn is thoroughly mixed with the compost that we had made. This process can be done by 3 ways, Spot spawning. In this type of spawning compost lumps are made and then spawn is mixed in it thoroughly with the help of hands. Second method is called Surface spawning in which is thoroughly spread over the compost and then properly spread compost on upper surface up to 3-4 cm. Third process is called as Layer spawning, In this method, minimum 3-4 layers of spawn and compost are made and then upper layer of compost is made finally.



### 4- Cropping and Harvesting

Harvesting of button mushroom is generally done when they attain a button size of approx. 4cm diameter approx. the harvesting is done 3 times in interval of 5 days in first, second and third flushes. Temperature of first and second flushes should be around 18-19 degree C and of third flushes should be 20 degree C .in the harvesting of Button mushroom, the head of the mushrooms is gently twisted and base of the mushroom is cut with the help of knife. Mushroom starts to grow after 10-12 days and mushroom crop can be harvested in 50-60 days. Mushrooms should be harvested by light twisting without distressing the casing soil and fill

the gap on soil bed by fresh casing material and spray water. Below are some images of harvesting of mushroom by Ayushi Tiwari in mushroom house of KVK Pithoragarh in Rural Horticulture Awareness Programme.



### 5-Post- harvest management

Washing and drying grading is done manually. Generally mushrooms are graded in 3 grade, Grade A in which big sized mushroom of 4cm diameter is placed , Grade B in which medium to big sized mushrooms are placed and Grade C where size doesn't matters, lightly damaged mushrooms are placed in this grade. Post- harvest management of mushrooms should also be done properly. After washing with KMS solution, Packing of mushrooms is done in polythene bags as per depending upon the market. Mushrooms are packed in different sized packages for example plastic pellets, cans and polythene polybags. Then mushrooms packed in polybags are sold to the local markets.



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## Pomegranate: A Wonder Fruit Crop



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### Introduction

The pomegranate is a common table fruit and very much liked for its refreshing juice, which has a high medicinal value. The fruits are also recommended for boosting the immunity of body against Covid-19. The fruit is **native of Iran**, where it was first cultivated in about 2000B.C. The hardy nature, low maintenance cost, high yield, better keeping quality and survival without irrigation make pomegranate cultivation a paying proposition. India ranks first with respect to pomegranate area and production in the world. In India pomegranate is cultivated on 1.12 lakh hectares area accounting for 1.7% of the area under fruits.

### Importance and Uses

Pomegranate considered as highly nutritious fruit. The edible portion in the fruit is 68%. It contains moisture 78%, protein 1.6%, carbohydrate 14.5%, calcium 100mg/100gm, phosphorus 70mg/100gm, iron 0.3mg/100gm, Vit.B<sub>2</sub> 0.10mg/100gm and vit.C 16mg/100gm. The fruits mainly used for dessert purposes. The fresh fruit is of exquisite quality while it proceeds product like bottled juice, syrup and jelly are highly appreciated. The juice considered as useful for patient suffering from leprosy.

### Climate

Pomegranate is a subtropical fruit. It can adopt itself to a wide range of climatic conditions and can grow up to 1800 m above sea level. The fruit tree grows best in semi-arid climate where cool winter and hot and dry summer prevail. The tree requires hot and dry climate during the period of fruit development and ripening. The optimum temperature for fruit development is 38 °C. The tree cannot produce sweet fruits unless the temperature is high for a suffering long period. Under humid conditions, the sweetness of fruit is adversely affected. Therefore, it is considered that pomegranate is a hardy fruit and can thrive well under drought conditions, though yield is low. In areas of low temperature, the tree behaves as deciduous and shed its leaves during winter months.

### Soil

It can be grown on diverse types of soil. The pomegranate is not very particular about its soil requirement. The deep loamy or alluvial soils are idea for its cultivation. It can tolerate soils which are slightly alkaline. It can thrive well on comparatively poor soils where other fruits fail to grow. It is rated as salt-hardy fruit plant.





## Varieties

1. Ganesh (GBG No.1 Ganesh is a seedling selection of Alandi by Dr. G.S.Cheema at Pune.
2. Alandi & Kandhari. Hard seeded var.
3. Jalore Seedless: soft seeded var. of Rajasthan.
4. Dholka: It is important var. of Gujrat.
5. Mridula
6. Muskat
7. Bassein Seedless
8. Bassein Seedless

## Propagation

Pomegranate is commercially propagated by Hard Wood Cutting. Mature wood is used for making the cuttings and these are 8 to 10 cm long. The cuttings are planted in nursery field in such a way that not more than one-third of the cutting is exposed. The best time of making of cutting is Dec-Jan when the plants shed leaves. For getting high percentage of rooting dip cuttings in 100 ppm IBA for 24 hours before planting in nursery bed.

## Planting Operation

- The plants are planted at the distance of 6 x 6 m apart in square system and it will be accommodate 275 plants/ha.
- The cultivar Ganesh can be planted at the distance of 3 x 3 m and Kandhari at 4 x 4 m apart.
- The best time of planting pomegranate in Northern India is dormant period i.e. January to mid-February and in south India during Monsoon season.

## Flowering and fruiting

In Western India, three flowering season i.e. Ambe bahar (January-February), Mrig bahar (June-July), Hasth bahar (October) have been reported. Ambe bahar is most commonly favoured by the grower because of high yield consequent to profuse flowering. Hasth bahar mainly preferred in arid-regions. In Punjab, only one flowering season is observed from April to June. In Bihar, twice flowering occurs, once during Feb-March and again during July-August. Under Delhi condition Dholka, Kandhari, Muskat, Patiala flowered only once in a year while Ganesh and Japanese Dwarf flowered twice.

## Irrigation

The plants may be individually watered daily or a week after planting. In Northern India where planting is done during the spring, regular watering may be given every 7-10 days till the start of monsoon.

## Intercropping

Intercropping in pomegranate orchard is highly desirable because it takes about 6-7 years to come to commercial bearing. Cabbage, cauliflower, tomato, cucurbits, papaya can be grown as intercrop with main crop.

## Manuring and Fertilization

In Northern India, farmyard manure is applied during December. Nitrogen should be given in two split doses, first half should be added in February and other half in April. The one year old tree should be manured with about 5-6 kg FYM and 625g N, 250g P<sub>2</sub>O<sub>5</sub>, & 250g K<sub>2</sub>O per plant for 4year tree.

## Training and Pruning

### Training

Pomegranate may be trained as multi-stemmed tree or single stemmed tree.

**(1). Multi-stemmed tree:** In this method 3-4 stems are left at hill and remaining shoots are removed, this will give a bush from look to the resultant tree. In Maharashtra, the growers prefer multi-stem training by retaining all stems. But yield has not been found to be affected by number of stems per plant.

**(2). Single-stemmed tree:** The single stem up to 30 cm is left by removing all the side shoots at the time planting. The main stem is headed back at a height of about 1 m result in the formation of branches. 4 or 5 well distributed branches on all sides above 60-70 cm from the ground level are allowed to grow. In the 3<sup>rd</sup> year of planting one can maintain desired shape of the pomegranate. Single stemmed tree has tendency to produce less number of shoots.





**Multi-stemmed training**



### Harvesting and Yield

Pomegranate is a non-climacteric fruit. Its fruits become ready for harvesting in 5-7 months after the appearance of blossoms. Mature fruits become slightly yellowish and further pink to red. On tapping, the fruits give metallic sound and when pressed they give a 'Crunch' sound. The average yield of well managed plantation may be as much as 200-250 fruits/tree.

### Plant Protection

Bacterial blight, Anthracnose is the major disease in pomegranate. Anthracnose cause more losses during storage of the fruit. Anar Butterfly is common insect of pomegranate tree which cause severe damage before harvesting. Anar Butterfly can be controlled by pre-harvest fruit bagging with polyethylene bag during march-April when fruit attained 3-4cm dia. of the size.

Fruit cracking is a serious problem of pomegranate. The malady is thought to be due to boron deficiency in young fruits while in developed fruits it may be caused due to variations in soil moisture content and atmospheric humidity. It can be controlled by Spray of borax 0.6%.

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## Low Cost Green Houses for Vegetable Production

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Agriculture is the backbone of India's economic activity and our experience during the last 50 years has demonstrated the strong correlation between agricultural growth and economic prosperity. The present agricultural scenario is a mix of outstanding achievements and missed opportunities. If India has to emerge as an economic power in the world, our agricultural productivity should equal those countries, which are currently rated as economic power of the world. We need a new and effective technology which can improve continuously the productivity, profitability, sustainability of our major farming systems. One such technology is the greenhouse technology. Although it is centuries old, it is new to India.

### **Greenhouse Technology**

Growing plants is both an art and a science. About 95% of plants, either food crops or cash crops are grown in open field. Since time immemorial, man has learnt how to grow plants under natural environmental conditions. In some of the temperate regions where the climatic conditions are extremely adverse and no crops can be grown, man has developed methods of growing some high value crop continuously by providing protection from the

excessive cold, which is called as Greenhouse Technology. So, Greenhouse Technology is the technique of providing favourable environment condition to the plants. It is rather used to protect the plants from the adverse climatic conditions such as wind, cold, precipitation, excessive radiation, extreme temperature, insects and diseases. It is also of vital importance to create an ideal micro climate around the plants. This is possible by erecting a greenhouse / glass house, where the environmental conditions are so modified that one can grow any plant in any place at any time by providing suitable environmental conditions with minimum labour.

Greenhouses are framed or inflated structures covered with transparent or translucent material large enough to grow crops under partial or fully controlled environmental conditions to get optimum growth and productivity.

### **Advantages of greenhouses**

- The yield may be 10-12 times higher than that of outdoor cultivation depending upon the type of greenhouse, type of crop, environmental control facilities.
- Reliability of crop increases under greenhouse cultivation.
- Ideally suited for vegetables and flower crops.
- Year round production of floricultural crops.
- Off-season production of vegetable and fruit crops.
- Disease-free and genetically superior transplants can be produced continuously.
- Efficient utilization of chemicals, pesticides to control pest and diseases.
- Water requirement of crops very limited and easy to control.
- Maintenance of stock plants, cultivating grafted plant-lets and micro propagated plant-lets.



## Hardening of tissue cultured plants

- Production of quality produce free of blemishes.
- Most useful in monitoring and controlling the instability of various ecological system.
- Modern techniques of Hydroponic (Soil less culture), Aeroponics and Nutrient film techniques are possible only under greenhouse cultivation.

## Status in India

While greenhouses have existed for more than one and a half centuries in various parts of the world, in India use of greenhouse technology started only during 1980's and it was mainly used for research activities. This may be because of our emphasis, so far had been on achieving self-sufficiency in food grain production. However, in recent years in view of the globalization of international market and tremendous boost and fillip that is being given for export of agricultural produce, there has been a spurt in the demand for greenhouse technology. The National Committee on the use of Plastics in Agriculture (NCPA-1982) has recommended location specific trials of greenhouse technology for adoption in various regions of the country.

Greenhouses are being built in the Ladakh region for extending the growing season of vegetables from 3 to 8 months. In the North-East, greenhouses are being constructed essentially as rain shelters to permit off-season vegetable production. In the Northern plains, seedlings of vegetables and flowers are being raised in the greenhouses either for capturing the early markets or to improve the quality of the seedlings. Propagation of difficult-to-root tree species has also been found to be very encouraging. Several commercial floriculture ventures are coming up in Maharashtra, Tamil Nadu and Karnataka states to meet the demands of both domestic and export markets.

The commercial utilization of greenhouses started from 1988 onwards and now with the introduction of Government's liberalization policies and developmental initiatives, several corporate houses have entered to set up 100% export oriented units. In just four years, since implementation of the new policies in 1991, 103 projects with foreign investment of more than Rs.80 crores have been approved to be set up in the country at an estimated cost of more than Rs.1000 crores around Pune,

Bangalore, Hyderabad and Delhi. Thus the area under climatically controlled greenhouses of these projects is estimated to be around 300ha. Out of which many have already commenced exports and have received very encouraging results in terms of the acceptance of the quality in major markets abroad and the price obtained.

## Classification of greenhouses

Greenhouse structure of various types are used for crop production. Although there are advantages in each type for a particular application, in general there is no single type greenhouse, which can be constituted as the best. Different types of greenhouses are designed to meet the specific needs. The different types of greenhouses based on shape, utility, material and construction are briefly given below:

### Greenhouse type based on shape

For the purpose of classification, the uniqueness of cross section of the greenhouses can be considered as a factor. The commonly followed types of greenhouses based on shape are:

1. Lean to type greenhouse.
2. Even span type greenhouse.
3. Uneven span type greenhouse.
4. Ridge and furrow type.
5. Saw tooth type.
6. Quonset greenhouse.
7. Interlocking ridges and furrow type Quonset greenhouse.
8. Ground to ground greenhouse.

### Greenhouse type based on Utility

Classification can be made depending on the functions or utilities. Of the different utilities, artificial cooling and heating are more expensive and elaborate. Hence based on this, they are classified in to two types.

- a) Greenhouses for active heating.
- b) Greenhouses for active cooling.

### Greenhouse type based on construction

The type of construction predominantly is influenced by structural material, though the covering material also influence the type. Higher the span, stronger should be the material and more structural members are used to make sturdy tissues.





For smaller spans, simple designs like hoops can be followed. So based on construction, greenhouses can be classified as

- a) Wooden framed structure.
- b) Pipe framed structure.
- c) Truss framed structure.

### **Greenhouse type based on covering material**

Covering materials are the important component of the greenhouse structure. They have direct influence on greenhouse effect, inside the structure and they alter the air temperature inside. The types of frames and method of fixing also varies with covering material. Hence based on the type of covering material they may be classified as:

- a) Glass glazing.
- b) Fibre glass reinforced plastic (FRP) glazing i. Plain sheet ii. Corrugated sheet.
- c) Plastic film

- i. UV stabilized LDPE film.
- ii. Silpaulin type sheet.
- iii. Net house.

Based on the cost of construction involved (which includes various factors mentioned from a to c)

- i High cost Green House
- ii Medium cost Green House
- iii Low cost Green House

The structural requirements and the cost per unit area for different models of low cost green houses for cultivation of vegetables are detailed below with diagrams to enable an interested entrepreneur to construct a low cost green house on his own accord. However, the local weather conditions and the individuals necessity play a major role in the selection of the model.





# Protected Cultivation of Capsicum

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Capsicum, also known as sweet pepper, bell pepper or Shimla Mirch is one of the popular vegetables grown throughout India. It is rich in Vitamin A (8493 IU), Vitamin C (283 mg) and minerals like Calcium (13.4 mg), Magnesium (14.9 mg) Phosphorus (28.3 mg) Potassium, (263.7 mg) per 100 g fresh weight.

Capsicum is a cool season crop, but it can be grown round the year using protected structures where temperature and relative humidity (RH) can be manipulated. This crop requires day temperature of 25-30°C and night temperature of 18-20°C with relative humidity of 50-60%. If temperature exceeds 35°C or falls below 12°C, fruit setting is affected.

## Advantages of protected cultivation

Colored capsicums are in great demand in urban markets. The demand is mostly driven by

hotel and catering industry. The traditionally grown green capsicum, depending upon variety and season, usually yields 20-40 tons per hectare in about 4-5 months. In the greenhouse, the crop duration of green and colored capsicums is about 7-10 months and yields about 80-100 t per hectare. The advantages of protected cultivation are;

Higher productivity resulting in increased yield Provides the better growing environment for plants Protects from rain, wind, high temperatures and minimizes the damage of insect pests and diseases thereby improving the quality and yield Facilitates year-round production coupled with yield enhancement by 2-3 times compared to open cultivation.

## Production practices

### Selection of Site

Selection of site for taking up of protected cultivation is a critical step and this has to be done





with utmost care. Places having high rainfall and humidity are not suitable for its cultivation, since this encourages many foliar diseases. Also the areas with high wind velocity are not suitable since they are likely to damage the structure and the polyethylene sheet frequently, thereby enhancing the maintenance cost of the structure. Avoid the location or area where heavy rains accompanied with gusty winds are prevalent to avoid damage to the protected structure. Well-drained sandy loam soils having good percolation is most suitable to grow capsicum. The soil pH of 6 to 7 and EC < 1 mmhos/cm is ideal for growing capsicums.

### **Green house structures**

The green house is designed depending on the prevailing local climatic conditions. A good number of different types of structures are built for protected cultivation. However, cost effective poly house and net house structures are most commonly used to grow capsicum in our country.

### **Net house (Shade net house)**

Growing of vegetables in net house is the cost effective method in many parts of southern states particularly in and around Bangalore. It is mainly due to easy availability of the granite pillars, which can give good strength to the structure and highly durable. Net houses are constructed using granite stone pillars of 12 feet height, 8 inch X 4 inch thickness. These pillars are placed at 2 feet depth inside the soil with concrete cement grouting.

### **Poly house**

Poly house gives better protection compared to net house due to total avoidance of rain water entry into polyhouse; hence leaf diseases can be easily controlled. Yield is normally 15-20 per cent more in polyhouse compared to net house.

### **Cultural and Nursery practices**

#### **Selection of cultivars**

Growing of capsicum hybrids in green house is useful to obtain continuous and regular flower and

fruit setting relatively for a long period of 8 to 10 months. Most of the capsicum hybrids produce green fruits that mature to red, orange or yellow depending on the hybrid. The fruits should have characters such as uniform size and shape preferably four lobes, fruit weight of >150g, uniform coloring after attaining complete maturity, with a better shelf life of more than 5 days under ambient conditions. Selected hybrid should be high yielding, with potential yield of >40t/acre. Hybrids should have shorter internodal lengths (7 to 10 cm), attaining maximum height of 10 feet in a crop period of 10 months. Popularly grown commercial hybrids in India include Indra, Yamuna (Green); Bomby, Triple star, Natasha, Inspiration, Pasarella (Red); Sunnys, Swarna, Orobelle, Bachata (Yellow). Capsicum hybrids with high yield potential (>100 t/ha) and having uniform size and shape needs to be selected. Hybrids preferably should have long growing period of 8- 10 months. Fruits should have 6 characters such as four lobes, uniform colour and ripening with better shelf life.

### **Nursery raising**

Good quality seeds are required for producing better seedlings. The seedlings are raised in pro-trays of 98 cells or cavities. About 16,000 to 20,000 seedlings are required to plant one acre for which 160-200 gm of seeds is required.

The pro-trays are filled with sterilized cocopeat and seeds are sown, one seed per cell to a depth of ½ cm and covered with the same media.

- The filled trays are stacked one above the other and covered with plastic sheets till germination of seeds.

### **Land preparation**

The land should be thoroughly ploughed and soil should be brought to fine tilth. Well decomposed organic manure at the rate of 20-25 kg per sq mtr is mixed with soil. One application is sufficient to grow three capsicum crops successively. Raised beds are formed after bringing soil to fine tilth. The bed size should be 90-100 cms



wide and 15-22 cms height. Between the beds walking space of 45 cms to 50 cm need to be provided.

### **Fumigation**

The crop beds are drenched using 4 per cent formaldehyde (@4 L/ m<sup>2</sup> of bed) and covered with black polyethylene mulch sheet. While treating with formalin, care should be taken to wear mask, gloves and apron. Four days after formalin treatment, the polyethylene cover is removed; the beds are raked repeatedly everyday to remove the trapped formalin fumes completely, prior to transplanting. Formalin treatment can be repeated after three crop cycles or whenever necessary. Fumigation with formaldehyde helps to minimize the soil borne diseases. Basamid can also be used for soil sterilization.

### **Fertilizer application**

A basal fertilizer dose of 20:25:20 NPK is required per acre and is applied to the beds uniformly before transplanting in the form of 80 kg calcium ammonium nitrate, 125 kg super phosphate and 32 kg murate of potash or 40 kg sulphate of potash.

### **Mulching and Spacing**

Black polyethylene non-recycled mulch film of 30-100 micron thick, 1.2 m wide, is used to cover the planting beds. Holes of 5 cm diameter are made on the polyethylene film as per the recommended spacing (45cm x 30cm). The planting beds are covered with the film by securing the edges of the sheet firmly in the soil. Mulching practice conserves water, controls weeds, reduces infestation of pests and diseases and results in higher yield and good quality produce.

### **Transplanting**

The planting beds are watered to field capacity before transplanting. Seedlings of 30-35 days old are used for transplanting. Care should be taken to see that no damage is occurred to roots,

while taking out the seedlings from individual cells of portray. Seedlings are transplanted into holes made in polyethylene mulch film at a depth of 5 cm. After transplanting, seedlings are drenched with 3 g/L copper oxy chloride or 3 g/L captan or 2 g/L copper hydroxide solution to the base of seedlings at the rate of 25-30 ml per plant. Watering 10 the mulched beds daily during afternoon by using hose pipe for a week continuously is essential to avoid mortality due to heat trapped by mulch sheet.

### **Pruning**

Capsicum plants are pruned to retain four stems. The tip of the plant splits into two at 5th or 6th node and are left to grow. These two branches again split in to two giving rise to four branches. At every node the tip splits into two giving rise to one strong branch and one weak branch. The pruning is done after 30 days of transplanting at an interval of 8 to 10 days, resulting in bigger fruits with better quality and high productivity. The capsicum plants can also be pruned to two stems and same level of yield can be maintained.

### **Training**

The main stem of plant is tied with four plastic twine to train along and tied to GI wire grid provided on the top of the plants. This is practiced after four weeks of transplanting. The new branches and plants are trained along the plastic twines.

### **Drip irrigation and Fertigation**

Drip irrigation is given to provide 2-4 liters of water per square meter per day depending on the season. Water soluble fertilizers are given through fertigation for entire crop growth period, starting from third week after transplanting.

### **Integrated Pests and Diseases Management**

Capsicum being relatively long duration (9-10 months) crop in polyhouse, the plant parts (vegetative, floral & fruit) are more exposed to adverse effect on the yield, quality and market value of the produce. Hence their identification and





management at right stage of the crop should be given importance. The major pests and diseases, their symptoms and their management in capsicum are given below. The major focus has been given on adoption of integrated approach in managing pests and diseases, that help to reduce the pesticide load, cost of chemicals and avoid the resurgence of pests and diseases.

## **Insect Pest and Management**

### **Thrips**

**Symptoms:** Thrips cause upward curling of leaves, sucks sap and reduce leaf growth, plant growth, yield and market value of produce. It also reduces leaf area and hinders absorption of nutrients and water by the plants. Increased infestation leads to blackening and drying of leaves and irregular fruit bearing.

**Management:** Remove affected plant parts including leaves, flowers and fruits.

### **Mites**

**Symptoms:** Young larvae and adults feed on leaves, bud and fruits, suck sap from plant parts which in turn causes downward curling of leaves. The size of leaf, fruit and plants gets reduced, fruit and flower drop affecting the market value of the produce. This pest infestation increases with increased temperature coupled with high humidity.

**Management:** Remove the pest damaged plant parts including leaves.

### **Aphids**

**Symptoms:** Nymphs and adult aphids suck sap from leaf veins and younger leaves resulting in reduced plant growth and decrease in yield. Its infestation not only causes curling of leaves but also spreads viral diseases.

### **Fruit borer**

**Symptoms:** Fruit borers are very active during night. The adults lay eggs on fruits, flowers and

leaves in large number and the nymphs that hatch out of eggs, feed on fruits and leaves causing heavy destruction of crops and severely affects the quality of the produce. Whenever night temperature is low, coupled with cool and high humidity the infestation is increased. Since eggs are laid in group, the larva also feeds gregariously on leaves at one place, which can be easily identified and destroyed.

**Management:** Pick and destroy nymphs and adult insects. Generally eggs are laid and hatch in groups, which is easy to identify from a distance.

## **Diseases and Management**

### **Damping off**

**Symptoms :** Infection takes place at the base of the young seedlings just above the ground level which leads to wilting and later death of seedlings. Any damage caused to seedlings while transplanting can also lead to damping off or seedling wilt besides fresh infection in main field or infection that is carried from nursery.

**Management:** Drench carbendazim (1g/L) or metalaxyl MZ (2g/L) or copper oxychloride (3g/L) or captan (3g/L) drenched to the base of the plant at about 25-50 ml/plant.

### **Powdery mildew**

**Symptoms:** The disease initially appears as tiny yellow spots on surface of leaf and powder like material on the lower surface leading to a powdery growth covering the entire lower surface of leaf which leads to drying and dropping of leaves at later stages. The disease reduces growth of leaves and fruits leading to low quality and quantity of the produce.

### **Cercospora leaf spot**

**Symptoms:** Cercospora appears initially as tiny yellow spot on leaf surface leading to increased dark grey spots which spreads on entire leaf resulting in dropping of leaf.



**Management:** Spray chlorothalonil (2.5g/L) or mancozeb (2.5g/L) or carbendazim (1g/L)

### **Harvesting and yield**

Early morning hours are best suited for capsicum harvest. Green capsicum can be harvested at 55 to 60 days after transplanting, yellow capsicum at 70-75 days whereas red capsicum at 80-90 days. Fruits can be harvested once in 3 to 4 days. Yellow and red fruits can be harvested when they have gained 22-50-80 per cent of the colour development. After harvest fruits should be kept in cool place and avoid direct exposure to sunlight. The fruits should be handled carefully by adopting clip harvest technique and scuffing should be minimized. The average yield of capsicum per acre is 30-40 tons.

### **Post-Harvest Management**

#### **Grading**

Capsicums are highly perishable in nature and lose water very rapidly due to shrivelling, drying & softening of the fruit which accelerates deterioration. Good quality fruits are selected and are cleaned with clean, dry and soft cloth to remove water drops or wetness or powdery residues of pesticides/ fungicides, if any, found on the fruits. Good quality fruits with 2-3 lobes weighing < 150

gram are graded as B grade fruits. Good quality fruits with uniform maturity, color, shape, size and free from defects spots, bruises or decay and pesticide residues should be used for packing while fruits showing signs of sunscald, mechanical or insect damage, or diseased misshaped and damaged fruits should be discarded. Generally fruits with 3-4 lobes weighing 150 gram and more are grouped as A grade fruits.

### **Packing and storage**

Graded fruits should be packed in CFB cartons (5/7 ply thick) in single or in multiple layers with paper shreds as cushioning material for long distance transport. The optimum conditions for storage of capsicum is 7- 8°C temperature with high relative humidity (90 to 95 %) where the shelf life of fruits can be extended for 2 to 3 weeks. Capsicums are sensitive to chilling injury below 5°C which leads to softening, pitting, and decay of fruits. Capsicum fruits should not be stored with other ripening fruits especially mangoes, papayas and tomatoes to prevent faster ripening and spoilage.

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# Pradhan Mantri Matsya Sampada Yojana: Booster scheme for Fish Farming Sector

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Fisheries and aquaculture are an important source of food, nutrition, employment and income in India. The sector provides livelihood to about 16 million fishers and fish farmers at the primary level and almost twice the number along the value chain. Fish being an affordable and rich source of animal protein, is one of the healthiest options to mitigate hunger and malnutrition.

## Introduction

The Pradhan Mantri Matsya Sampada Yojana (PMMSY) scheme for focused and sustainable development of fisheries sector in the country with an estimated investment of Rs. 20,050 crores for its implementation during a period of 5 years from FY 2020-21 to FY 2024-25 in all States/Union Territories, as a part of Aatma Nirbhar Bharat Package.

The investment of Rs. 20,050 crores under PMMSY is the highest ever in the fisheries sector. Out of this, an investment of about Rs 12340 crores is proposed for beneficiary-oriented activities in Marine, Inland fisheries and Aquaculture and about Rs 7710 crores investment for Fisheries Infrastructure.

The oriented activities supported under the PMMSY include development of hatcheries, construction of Grow-out and rearing ponds, input cost for culture activities, Re-circulatory Aquaculture System (RAS), cage culture in reservoirs, open sea cages, seaweed culture, bivalve culture, construction of raceways for trout farming, ornamental and recreational fisheries, support for acquisition of deep sea fishing vessels, up-gradation of existing fishing vessels, support for providing safety kits for fishermen of traditional and motorized fishing vessels, providing boats and nets for traditional fishermen, support for purchase of communication/Tracking and PFZ devices.



### Main Fact-

- The PMMSY also supports for construction of cold storage, ice plants, fish meal plants/mills, construction of fish retail markets, kiosks, fish value added enterprises units, e-platform for e-trading and e-marketing, establishment of disease diagnostic and quality testing labs, insurance to fishermen and fishing vessels, livelihood and nutritional supports for socio economically backward active traditional fishers etc.
- The Pradhan Mantri Matsya Sampada Yojana (PMMSY) is an initiative launched by the Government of India to establish a comprehensive framework and reduce infrastructural gaps in the fisheries sector.
- The scheme was announced by the Finance Minister, Nirmala Sitharaman during her speech in the parliament of India while presenting the Union budget for 2019–20 on 5 July 2019.
- PMMSY is a flagship scheme for focused and sustainable development of the fisheries sector in the country as a part of the Aatmanirbhar Bharat Abhiyan.
- The scheme intends to address critical gaps in fish production and productivity, quality, technology, post-harvest infrastructure and management, modernisation and strengthening of value chain, traceability, establishing a robust fisheries management framework and fishers' welfare.

### Objective:

- Harnessing of fisheries potential in a sustainable, responsible, inclusive and equitable manner
- Enhancing of fish production and productivity through expansion, intensification, diversification and productive utilization of land and water
- Modernizing and strengthening of value chain - post-harvest management and quality improvement
- Doubling fishers and fish farmers incomes and generation of employment

- Adopt 'Cluster or Area-based Approaches' and create fisheries clusters through backward and forward linkages.
- Focus especially on employment generation activities such as seaweed and ornamental fish cultivation.
- Address critical gaps in fish production and productivity, quality, technology, post-harvest infrastructure and management, modernisation and strengthening of the value chain, traceability, establishing a robust fisheries management framework and fishers' welfare.
- Consolidate the achievements of the blue revolution and bring new interventions such as fishing vessel insurance, support for new/up-gradation of fishing vessels/boats, integrated aqua parks, e-trading/marketing, etc.

### Implementation:

It will be implemented as an umbrella scheme with two separate components namely:

- **Central Sector Scheme:** The project cost will be borne by the Central government. Wherever direct beneficiary oriented i.e. individual/group activities are undertaken by the entities of central government including National Fisheries Development Board (NFDB), the central assistance will be up to 40% of the unit/project cost for General category and 60% for SC/ST/Women category.
- **Centrally Sponsored Scheme:** All the activities will be implemented by the States/UTs and the cost will be shared between Centre and State.
  - (a) North Eastern & Himalayan States : 90% Central share and 10% State share.
  - (b) Other States : 60% Central share and 40% State share.
  - (c) Union Territories (with legislature and without legislature): 100% Central share.

### Beneficiaries

The intended beneficiaries under the Pradhan Mantri Matsya Sampada Yojana are: (i) Fishers (ii) Fish farmers (iii) Fish workers and Fish vendors (iv) Fisheries Development corporations (v) Self Help Groups (SHGs)/Joint Liability Groups (JLGs) in fisheries sector (vi) Fisheries cooperatives





(vii) Fisheries Federations (viii) Entrepreneurs and private firms (ix) Fish Farmers Producer Organizations/Companies (x) SCs/STs/Women/Differently abled persons (xi) State Governments/UTs and their entities including (xii) State Fisheries Development Boards (xiii) Central Government and its entities.

### Implementation Strategy and Activities

- PMMSY fully recognizes the roles of the States/Union Territories for effective implementation and optimal outcomes. While majority of the activities under the Scheme would be implemented in partnership with States/UTs, in some of the key areas of national importance, the entire funds would be borne by Central government.
- The Scheme would maintain a fine balance between production and productivity activities including technology infusion, post-harvest infrastructure including strengthening and modernization of value chain and a robust Management and Regulatory Framework.
- The scheme would create a conducive environment for private sector participation, development of entrepreneurship, business models, promotion of ease of doing business, innovations and innovative project activities including start-ups, incubators etc. in fisheries sector.
- Promotion of startups in Fisheries and Aquaculture, incubation centers, sea ranching, encouraging innovations, entrepreneurship models are some of the pioneering approaches envisaged under PMMSY.
- Focused fisheries development in J&K, Ladakh, Islands, Northeast, and Aspirational Districts through area specific strategic development planning.
- PMMSY envisages an activity wise minimum assured financial allocation with clear

quantifiable physical targets. This give an assured investment in key sub-sectors unlike thin and wide spread of financial resources under Blue Revolution.

- For addressing diseases, antibiotics and residues issues, aquatic health management is given focus under PMMSY supported by an Integrated Laboratory Network.
- Development of Coastal fisher communities in a holistic manner through integrated modern fishing villages with necessary infrastructure is envisaged for the first time under PMMSY.
- Under PMMSY Insurance coverage for fishing vessels would be introduced for the first time. Further, enhanced insurance cover for fishermen would be incorporated.
- Well-structured extension support services are envisaged under PMMSY for the first time to provide requisite services to fishers and fish farmers. Youth would be engaged in fisheries extension by creation of 3347 *Sagar Mitras* in coastal fisher villages.

### Conclusion

The Scheme would facilitate cluster development, economies of scale, enhancing competitiveness of fisheries sector, generation of higher incomes to the stakeholders, etc. While accelerating growth and expansion of the sector in an organized manner, the PMMSY would create a conducive environment for development of entrepreneurship and encourage private sector participation.

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