

VOL.01 ISSUE.02

JUST AGRICULTURE

THE FUTURE OF AGRI INNOVATION

3.4%

GROWTH



IN GDP

A SILVER LINE EMERGES FROM
AGRICULTURE SECTOR

OCTOBER 2020

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FROM THE FOUNDER EDITOR'S DESK



Dear Readers,

The last six months in Indian Agriculture have witnessed paradoxical circumstances. Amid the COVID crisis, besides the uncertainty in health, economy and others sectors, Agriculture is the only bright spot with spike of 3% growth sector in India. The Inter-Ministerial Committee has the target of Doubling the Farmer's Income (DFI) by 2022 which uplift the agriculture sector and enormous e-commerce and agribusiness models have started during this pandemic period. The young professionals understand the potential of this sector. So, during this COVID, education and publishing sector effected. It will be difficult for the academicians to publish and get innovative knowledge about agriculture specialisation. So being as Young Agriculture Professional, I think about starting an e-magazine which provides platform to bound all the agriculture students, scholars and research oriented people.

We are glad to introduce the second issue of JUST AGRICULTURE e-Magazine, which also happens to be our first online publication. Carrying forward our vision of starting this agriculture e-magazine is to engage all the agriculture students, scholars and research oriented people and to increase the writing capacity of agriculture students. Our magazine features about agri innovations, farm ventures and agribusiness, success stories of progressive farmers in India are innovating conventional practices to become successful farm entrepreneurs.

The word "Just Agriculture" signifies the prominence given to the agriculture field and other allied sciences in today's era. Our magazine offers sufficient platform and broad coverage for agriculture researchers and scientists for deliberating connecting throughout India and globally.

For the agriculture students endowed with inquisitive mind and driven by professional goals, this magazine will be a voyage of discovery.

Keep Reading....

D.P.S. BADWAL
Founder Editor,

JUST AGRICULTURE magazine

FROM THE DESK OF CHIEF EDITOR



It is the great pleasure moment for me to introduce all of you with the agriculture magazine "Just Agriculture". In my concern this magazine just agriculture will provide you innovative research and recent trends of various field of agriculture.

In this magazine we will consider all the concern article related to agronomy, plant genetics & breeding, plant pathology, agriculture chemistry and soil, agriculture biotechnology and biochemistry, veterinary and Animal husbandry and other related fields of agriculture. As the chief editor I insure that you will get all the recent trends, development and innovative idea's in this magazine.

Finally, I would like to thank the editorial and reviewer's team, authors as well as publishers and team members for contributing to this second issue. Editors will welcome all constructive criticisms as well as new suggestions to improve the quality of the magazine.

Mohit Bharadwaj
Editor-in-Chief

Just Agriculture-the Magazine



North India's First Agriculture E-Magazine

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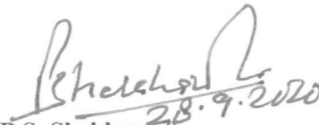
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MESSAGE

I want to extend my best wishes to the team of **Just Agriculture Magazine** for coming up with the brilliant idea of launching this magazine. This magazine is providing a common platform to all the agricultural students and researchers not only from India but across the globe for publishing their popular & technical articles, success stories and short communications. Besides of agricultural students and researchers, this magazine would be very helpful for all the progressive farmers and entrepreneurs who are indulged in agricultural & allied activities.

I am sure that this magazine will certainly perform the best as per its name "**Just Agriculture**" reminds me about the famous quote of our former Prime Minister Pt. Jawaharlal Nehru that "*Everything else can wait, but not agriculture*".

I appreciate all the efforts of the Editors of **Just Agriculture Magazine** who are working relentlessly for the success of this magazine.


(P.S. Shekhawat)
28.9.2020
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MESSAGE

The dissemination of updated information till the end users is the key of successful sustainable agriculture in the today's era, when huge information of diverse nature is being generated regularly. The idea behind bringing such information in the form of volume(s) like **Just Agriculture Magazine** is absolutely a brilliant.

I appreciate the efforts of Editorial team members of **Just Agriculture Magazine**, who are working relentlessly for bringing the scattered information into concise form to the intended users.

I wish a great success for this publication in future.

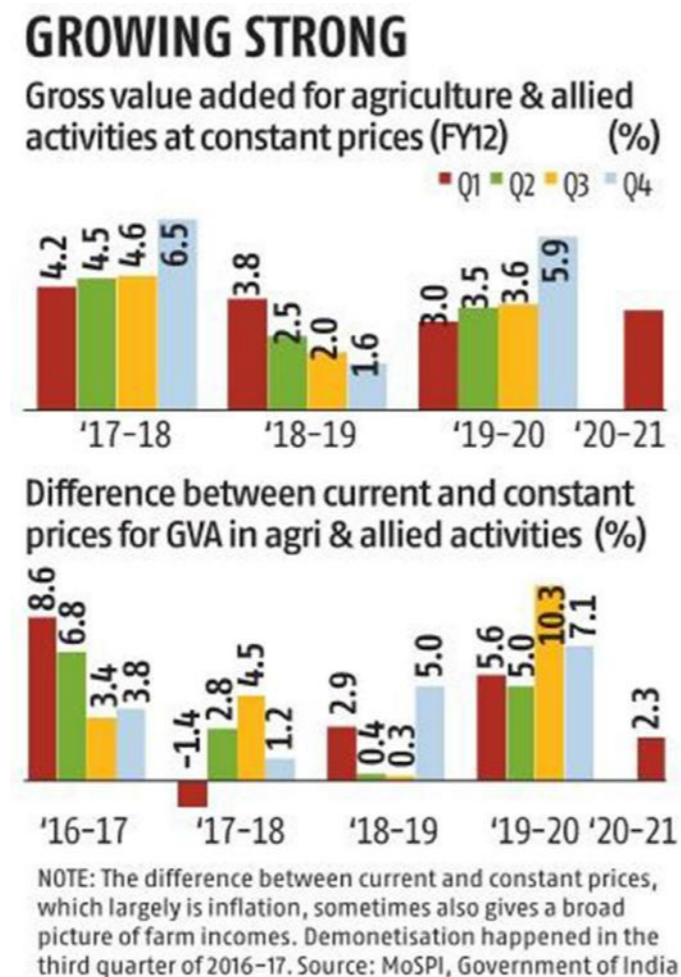

(R M Sharma)

Date: 28.09.2020

SILVER LINE EMERGES FROM AGRICULTURE SECTOR WITH 3.4% GROWTH IN GDP

Estimate for June quarter 2020 reported a contraction of 23.9 per cent in national GDP and it was expected due to the COVID-19 pandemic and the lockdown that followed which resulted in the cessation of economic activities. But what comes as a silver lining is the exceptional show of the agriculture sector. Agriculture was the only sector to have reported the positive growth. Agriculture was the only sector to grow for April-June 2020 among eight used to compute India's Gross Domestic Product (GDP). India's GDP shrank by 23.9 per cent according to the National Statistical Office's released estimates for the first quarter (Q1). The economy grew 5.2 per cent in the same period a year ago. GDP in monetary terms during the first quarter was estimated at Rs 26.90 lakh crore. This was Rs 35.35 lakh crore last year for the same quarter. This means there has been an overall loss of Rs 8.45 lakh crore. Gross value added (GVA) by agriculture has grown by 3.4 per cent in this quarter, compared to last year. In other words, the sector has added Rs 14,815 crore in the first three months of the fiscal in absolute monetary terms. In the overall GVA, the quarter experienced a contraction of 22.8 per cent in comparison to last year. The country had observed mobility restrictions as mandated under the lockdown measures for the better part of the first quarter of FY21.

Reserve Bank of India (RBI) released its Annual Report 2019-20 which showed that agriculture in 2019-20 recorded a real GVA growth of 4.0 per cent. This was due to the record food grain production. This accounted for 15.2 per cent of the overall economic growth. For the agriculture sector, this is a new record. It surpassed the industrial sector's contribution to economic growth that was just 4.7 per cent in 2019-20. This was for the first time since 2013-14 that agriculture regained this economic prominence. RBI estimated that this growth positively impacted the economy of 48.3 per cent of the country's total households. "As regards the evolution of aggregate supply conditions in 2019-20, agriculture and allied activities provided a silver lining, with record food grains and horticulture production and favourable terms of trade for the farm economy", said RBI, which



otherwise has termed the last fiscal year as one of the worst in terms of economic growth. But it gave a warning as well which has been a nagging problem for farmers in recent years: the challenge of managing supply gluts, particularly in cereals. Farmers have not been earning a fair price for their produce even though food inflation has been high or consumers have been paying more for agricultural produce. In its prospect review for 2020-2021, the RBI annual report has suggested that without a fair term of trade for agriculture, the income would not be proportionate to the production. This is what haunts the farmers now: Will they reap a good economic harvest?

Himani Gautam

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The 1Q-FY21 GDP growth numbers highlight an extremely challenging outlook for the Indian economy with only one sector namely agriculture, showing positive growth on the output side, and only one demand segment namely, government final consumption expenditure, showing positive growth." by Dr. D K Srivastava, Chief Policy Advisor, EY India

Industry	Apr-June (2019-20)	Apr-June (2020-21)
Agriculture, forestry & fishing	3.0%	3.4%
Manufacturing	3.0%	-39.3%
Trade, hotel, transport, communication & services related to broadcasting	3.5%	-47.0%
Public administration, defence & other services	7.7%	-10.3%
Gross Value Added (GVA)	4.8%	-22.8%
Gross Domestic Product (GDP)	5.2%	-23.9%
(at Basic Prices in Q1 (April-June) of 2020-21)		

AGRICULTURE ONLY SILVER LINING

However, amid the grim, one sector Agriculture emerged as the only saviour giving hope for future. Agriculture sector registered a 3.4 per cent GDP growth. Had it not been a robust performance in the Agri sector, India's GDP would have tumbled further. "Positive agricultural output is the only positive

element in the GDP print," says Nish Bhatt, Founder & CEO, Millwood Kane International.

The nationwide lockdown coincided with the Rabi season harvests and facilitated by relaxation in lockdown, may not have resulted in a big rise in income for a section of farmers. The latest GDP figure for agriculture is encouraging given the disruption in the supply chains and the subsequent impact on the income of farmers. India's rabi production in the 2019-20 crop year (July to June) is estimated to be around

149.60 million tonnes, 4.10 per cent more than the previous year. Of that, wheat output is estimated at a record 106.21 million tonnes, which is 2.51 per cent more than last year. The current estimate includes the agricultural production for the Rabi season (including production of dairy products, fishery and poultry). Evidence for this is gross value added (GVA) at current prices for agriculture and allied sectors rising 5.7 per cent in Q1 of 2020-21 against 8.6 per cent in the same quarter last year. This translates into an agricultural inflation rate of 2.3 per cent in Q1 2020-21. This was among the lowest increases in inflation in agriculture items in more than a year. Inflation, which is sometimes used as proxy for farmers' income, was down, according to some experts, largely due to a dip in prices of items in allied sectors which include horticulture, livestock, fisheries and dairy. Though prices of core crops remained largely steady

during the lockdown months of April to June, mainly due to strong government procurement, prices of horticulture produce, namely vegetables and livestock items such as eggs, meat and milk dropped sharply at the producer's level due to disruption in supplies from mandis to consumers and unfounded rumours about the virus spreading to protein food. Perhaps this was a reason why there was a divergence between wholesale prices and consumer prices in the lockdown months and in July, after the restrictions were relaxed.

In the kharif season, the acreage has already surpassed recent records. Agriculture has attracted huge private investments in July-August, this is unusual, given the large number of farmers quitting farming in recent years. But the reverse migration to villages and the uncertainty of future livelihood has forced many to invest back on agriculture. Its economic impact would be known when the GDP estimate for the

next quarter is released at the end of September. But what has emerged since last year is that agriculture is slowly gaining its relevance to the national economy. The surge in kharif average is a clear sign of revival of interest in agriculture, tractor sales went up by 38.5 per cent. This also means that farmers are investing more this kharif season, not just on inputs but also on big facilitating machinery like tractors. So, the profit has to be proportionate. But this depends on whether the farmers get the right price for their produce.

India imposed one of the strictest lockdowns in the world on March 25 to help stop the spread of COVID-19, bringing all economic activities to a grinding halt. The Indian economy is facing the most unprecedented shock in economic activities due to the lockdown. Govt. has started unlocking the country in a phased manner since June 1. Though businesses and economic activities have started picking up since

then, India's economy still doesn't seem to be out of the woods.

A healthy economy grows over time and it's indicated in its increasing GDP or the value of the goods and services it produces. Recession is defined as a period when economic activities contract for two quarters in a row (or six months). Another contraction in the current July-September quarter and India would officially enter recession, which occurs when there is a contraction in business cycle, caused by shrinking economic activity and followed by a consequent decline in spending. July 2020 was worse than June 2020 and the data for August 2020 is also not very encouraging. So chances are very high that there would be another contraction in Quarter 2 of Financial Year 2020-21.



WHAT'S IN THE FARMER ORDINANCE BILLS? & WHY THE OPPOSITION?

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D.P.S. Badwal
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Just Agriculture-magazine)

BILL ON AGRI MARKET

Farmer's Produce Trade and Commerce (Promotion and Facilitation) Bill, 2020

PROVISIONS-

- * To create an ecosystem where farmers and traders enjoy the freedom to sell and purchase farm produce outside registered 'mandis' under states APMCs.
- * To promote barrier-free inter-state and intra-state trade of farmers' produce.
- * To reduce marketing/transportation costs and help farmers in getting better prices.
- * To provide a facilitative framework for electronic trading.

OPPOSITION-

- * States will lose revenue as they won't be able to collect 'mandi fees' if farmers sell their produce outside.
- * What happens to 'commission agents' in states if entire farm trades moves out of 'mandis'?
- * It may eventually end the MSP-based procurement system.
- * Electronic trading like in e-NAM uses physical 'mandi' structure.
- * What will happen to e-NAM if 'mandis' are destroyed in absence of trading?



So, we can say that bill will accelerate digital transactions and organized sector participation in agriculture sector, and that's what has ruffled the feathers. If farming has to survive, contract farming and open market are necessary. Subsistence farming is not going to feed the ever growing population in future and farming also cannot survive economically with subsidies.

More than for farmers it's the fear of the long entrenched middlemen segment which is being vocalized as farmers protest. However, this bill is not clear how it will benefit the marginal and share croppers, whose numbers are quite significant, and without developing them, the larger issue of rural poverty can't be solved. So, government should also think twice about these bills. There is a need to aware the farmer's about the new farming strategies. Farmer's can adopt the new strategies and bills in future but they want that govt. should fix the MSP of the crops first.

BILL ON CONTRACT FARMING

The Farmers (Empowerment and Protection) Agreement of Price and Assurance and Farm Services Bill, 2020

- * Farmers can enter into a contract with agri-business firms, wholesalers, exporters or large retailers for sale of future farming produce at a pre-agreed price.
- * Marginal and small farmers, with landless than five hectares, to gain via aggregation and contract (Marginal and small farmers account for 86% of total farmers in India).
- * To transfer the risk of market unpredictability from farmers to sponsors.
- * To enable farmers to access modern technology and get better inputs
- * To reduce cost of marketing and boost farmers income.
- * Farmers can engage in direct marketing by eliminating intermediaries for full price realisation.
- * Effective dispute resolution mechanism with redressal timelines.

OPPOSITION-

- * Farmers can engage in direct farming arrangements will be the weaker players in terms of their ability to negotiate what they need.
- * The 'sponsors' may not like to deal with a multitude of small and marginal farmers.
- * Being big private exporters, customers, processors, wholesalers, the sponsors will have edge in disputes.

BILL RELATING TO COMMODITIES

The Essential Commodities (Amendment) Bill, 2020

- * The remove commodities like cereals, pulses, oilseeds, onion and potatoes from the list of essential commodities. It will do away with the imposition of stockholding limits on such items except under "extraordinary circumstances" like war.
- * This provision will attract private sector/FDI into farm sector as it will remove fears of private investors of excessive regulatory interference in business operations.
- * To bring investment for farm infrastructure like cold storages, and modernising food supply chain.
- * To help both farmers and consumers while bringing in price stability.
- * To create competitive market environment and cut wastage of farm produce.

OPPOSITION-

- * Big cos will have freedom to stock commodities-it means they will dictate terms to farmers, which may lead to less prices for the cultivators.
- * Recent decision on export ban on onion creates doubt on its implementation.
- * Price limits set for "extraordinary circumstances" are so high that they are likely to be never triggered.

INCREASE IN MINIMUM SUPPORT PRICE (MSP) FOR RABI CROPS IN INDIA

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Soil Science and Agricultural Chemistry,

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India is a nation where farming comprises one of the major sources of income. Growing up one is always taught that the farmer is the main contributor of the economy. In this article, we have analyzed farmers awareness about Minimum Support Price (MSP), What is MSP for Farmers?? Minimum Support Price (MSP) in agriculture directs the intervention by the Government of India. It gives assurance and long term financial stability to farmers. In case of price drop due to bumper production, the government agencies purchase the entire quantity of agro products at the announced minimum support price. Based on the recommendation made by the Commission for Agricultural Costs and Prices (CACPC), every year, at the beginning of the sowing season. The Department of Agriculture and Co-operation, Government of India declares the minimum support prices (MSP) for certain crops. The objective of the MSP is thus to ensure remunerative prices to the growers for by encouraging higher investment and production. MSP is the floor price provided by the government to procure farmers produce. It also becomes applicable in cases when the prices fall, then the government procures the produce at MSP.

MINIMUM SUPPORT PRICE (MSP) CROPS IN INDIA

Under the MSP ordinance, there are 22 MSP crops, 14 of those mandate crops are in the Kharif season, 2 commercial crops and 6 rabi crops. On the basis of the minimum price of rapeseed/ mustard and copra the MSPs if de-husked coconut and toris are fixed. Following is the list of crops under MSP India:

- Cereals (7) - paddy, wheat, barley, jowar, bajra, maize and ragi
- Pulses (5) - gram, arhar/tur, moong, urad and lentil
- Oilseeds (8) - groundnut, rapeseed/mustard, toria, soyabean, sunflower seed, sesamum, safflower seed and niger seed
- Raw cotton
- Raw jute
- Copra
- De-husked coconut
- Sugarcane (Fair and remunerative price)
- Virginia flu cured (VFC) tobacco

The Cabinet Committee on Economic Affairs (CCEA) chaired by the Prime Minister Shri Narendra Modi has approved the increase in the Minimum Support Prices (MSPs) for all mandated Rabi crops for marketing season 2021-22. This increase in MSP is in line with the recommendations of Swaminathan Commission.

In view of nutritional requirements and changing dietary pattern and to achieve self-sufficiency in pulses and oilseeds production, the Government has fixed relatively higher MSP for these crops.

Crops	MSP for RMS 2020-21 (Rs/quintal)	MSP for RMS 2021-22 (Rs/quintal)	Cost of Production 2021-22 (Rs/quintal)	Increase in MSP (Rs/quintal)	Return over cost (in per cent)
Wheat	1925	1975	960	50	106%
Barley	1525	1600	971	75	65%
Gram	4875	5100	2866	225	78%
Lentil (Masur)	4800	5100	2864	300	78%
Rapeseed & Mustard	4425	4650	2415	225	93%
Safflower	5215	5327	3551	112	50%

**Includes all paid out costs*

The highest increase in MSP has been announced for lentil (Rs.300 per quintal) followed by gram and rapeseed & mustard (Rs. 225 per quintal each) and safflower (Rs. 112 per quintal). For barley and wheat, an increase of Rs. 75 per quintal and Rs 50 per quintal respectively has been announced. The differential remuneration is aimed at encouraging crop diversification.

After an increase of Rs 50, MSP of wheat is now Rs 1975 per quintal, MSP of Chana (Gram) has been increase by Rs 225 per quintal to Rs 5100. MSP of Masur (Lentil) has been fixed at Rs 5100 per quintal after increase Rs 300. MSP of Sarson (Mustard) has been hiked by Rs 200 to Rs 4050 per quintal. MSP of

Barley has increase by Rs 75 to Rs1600 per quintal, after increase of Rs 112, MSP of Safflower is now Rs 5327 per quintal.

The increase in MSP for Rabi Crops for marketing season 2021-22 is in line with the principle of fixing the MSPs at a level of at least 1.5 times of the All-India weighted average Cost of Production as announced in Union Budget 2018-19. The expected returns to farmers over their cost of production are estimated to be highest in case of Wheat (106%) followed by rapeseed & mustard (93%), gram and lentil (78%). For barley, return to farmers over their cost of production is estimated at 65% and for safflower, it is 50%.



AGRI-WEATHER APPS:

KEY GUIDE FOR AGROMET-ADVISORY SERVICES

KARAN CHHABRA*, **MANOJ KUMAR**
ICAR-CITH, KRISHI VIGYAN KENDRA, BARAMULLA, J&K

MEGHDOOT APP

Vernacular Agro-advisory mobile app that provide location, crop and livestock specific weather based advisories to farmers in their local language.

STEPS INVOLVED

- *Go to play store app of your mobile phone.
- *Write Meghdoot app in the search box. Install the App in your Mobile Phone.
- *After installing, click open. Register by giving your location indicating State and district.
- *Click open icon, the app will display information like temperature, precipitation etc. for your location.
- *The App will also give information for major crops viz., cereals, vegetables fruit crops and livestock grown in a particular location.

- *Ministry of Earth Sciences launched a mobile App; Meghdoot
- *Launched in August 2019 and covered 68 districts.
- *Developed by IMD, IITM and ICAR and aptly named as Meghdoot or Cloud messenger
- *Provide location based weather agro advisories to farmers.
- *Also provide Crop and livestock advisories for specific locations on every Tuesday and Friday
- *Simple to use by signing with Name, Mobile No., State and District.
- *Apps; advisories come in 10 languages including Hindi also.
- *Also bears features; 'Past weather-track' weather pattern in the selected region for the past seven days.

DAMINI: LIGHTENING ALERT APP

Vernacular Agro-advisory mobile app that provide warning to the user about the lightning on the basis of user location. Lightning is shown in the map on the basis of 5 min lightning, 10 min lightning and 15 min lightning.

STEPS INVOLVED

- *Go to play store app of your mobile phone.
- *Write Damini App in the search box .Install the App in your Mobile Phone
- *After installing, click open. Register by giving your location indicating State and District.
- *The App also gives information and instructions on lightening
- *According to the weather forecast, the App also provides advisories in advance for managing the risks.

- *The IITM, Pune under the Ministry of Earth Science has established a lighting location network with installation of around 48 sensors in different parts of the country.
- *Lightening is a phenomenon that has not only fascinated but also scared mankind. Each second about 50-100 lightening strikes occur over the earth.
- *Recent data suggests lightening alone account for about 2000-2500 deaths every year in India.
- *This app gives exact location of current lightening strikes, probable locations of impending lightening around area of 40 sq km and movement of direction of thunderstorm.
- *Help in getting advance information about impending lightening activity.

MAUSAM APP

Vernacular Agro-advisory mobile app that provide city-wise weather forecasts, now casts and other warnings.

*The Ministry of Earth Sciences, India has launched a new mobile application called "Mausam" which will help users track weather updates and also bring in the enhanced forecast as well as warning services from the government.

*The app was designed and developed in a joint effort made by ICRISAT's Digital Agriculture and Youth team, Indian Institute of Tropical Meteorology (IITM) in Pune, and IMD.

*Meghdoot was meant only for farmers. This is for everyone.

*The now-cast feature of this app will tell you if there will be rain, thunder or any other severe weather in your area based on data from the nearest meteorological station.

STEPS INVOLVED

- *Go to Google Play Store/Apple App Store.
- *In the Search box, type Mausam app.
- *In the list which appears, go for the app named; Mausam-Indian Weather App.
- *You can start downloading the app and start using the app.



Meanwhile, for the farmers, it seems tough in navigating the vagaries of weather, and often, just knowing the weather forecast is not enough. There is a need of more information to better manage the farm and the crops. The initiatives of Ministries of Earth Sciences and Agriculture while launching these agri-weather apps filled this gap, through giving out

weather forecast-based agro advisories to farmers and local people in different regions in their own languages. These helped farmers to get better knowledge of weather conditions in advance to reduce their crop losses and enhance income/profits through adoption of Climate Smart Agriculture based technologies.

HOW TO INSPIRE INDIA'S YOUTH TO TAKE UP FARMING

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INTRODUCTION

Saving India's agriculture is that the country's most significant agenda. There will not be a next generation of farmers left in the country. In step with the Census 2011, per day 2,000 farmers are quitting farming. The young among the farming communities are hardly interested in agriculture. Even a majority of students graduated from agricultural universities switch to different professions. Unfortunately, agriculture still appears dependable despite dipping contribution to the country's gross domestic product (GDP), 55 per cent of the personnel hails from the agriculture sector. Since, the agricultural sector has been neglected. Although 80-90 per cent of students studying agriculture belong to the farming community, most of them favor to select a unique career. At present, around 0.4 million students are listed in agricultural universities and institutes. But sadly, only 0.1 million students manage to graduate. Most of them decide to be part of the banking sector. We need to stop neglecting agriculture sector. There are many ways to increase job opportunities for agriculture students. Government should provide schemes to encourage students of agriculture stream. Both government and corporate sectors must provide scholarships for agriculture students to improve the research and development.

NEED OF YOUTH IN AGRICULTURE

Hardly 5% of youth are in agriculture even more than 60% of rural population depends partly or completely on farming activities, it is clear that youth are not interested in agriculture and choosing it as their profession. As the population of farming profession is getting old, it will be a threat of

Agriculture in future, as it can stop it from growing to its full extent. The engagement of youth in Agriculture is important because they are more energetic and are receptive to ideas and technology. Along with this youth have guts to face anything and take risks which are mostly required in the framing sector. Agriculture requires ideas & anxiety and only the youth can provide it. Active participation of youth in farming sector will reduce the rate of unemployment in villages.

WHY YOUTH ARE NOT ATTRACTED TO AGRICULTURE

The youth in villages are not attracted agriculture anymore because they have seen their fathers and forefathers struggling to meet their livelihood. The low productivity and sometimes failure of crops results in poverty. It is like that their forefathers were in farming sector, their father is in farming sector but still they are struggling for their daily needs, this is pulling them away from choosing their profession in farming sector. Even their parents don't want them to take up this occupation.



STRATEGIES TO INSPIRE YOUTH TO TAKE UP AGRICULTURE

1. In primary education the subject related to agriculture must be included so that the future generation will have an idea about the farming sector and struggle of farmers.
2. Agriculture is the biggest sector in the country, yet it is not considered as a respectable profession, this perception should be changed.
3. Youth should be motivated by showing success stories of agriculture students in Maharashtra and Punjab whose have taken up farming
4. Awareness to youth about modern techniques and profitable farming in less land area
5. Farmers grow same crops to sustain their livelihood, the government should provide minimum support price to all crops
6. Loans should be provided to farmers with low rate of interest which can gain some attention from youth of rural areas
7. Crop insurance should be provided by the government in this climate changing era which can

be a promising thing to encourage youth into farming sector

8. Youth must be trained and made aware of latest farming technologies
9. Agriculture Universities should inspire students to become entrepreneurs by making them to practice new innovations
10. Generation of jobs for students pursuing agriculture.

CONCLUSION

Agriculture is the backbone of our country and future of the nation is in the hands of youth, the word age doesn't matters will not applicable in agriculture because the capacity to do work in fields reduces as the age increases, so there will be a need for youth to replace the old farmers. And this can be achieved only by inspiring the youth to take up farming as their profession. For that farming should be treated as a respectable profession. Government should encourage farmers by providing attractable schemes and minimum support prices for all crops. Loans should be given to the persons who are interested in Agri Startups. This will be a great step for encouraging youth to get involved in agriculture sector.

BUD CHIP TECHNOLOGY:

A SUSTAINABLE METHOD OF SUGARCANE PROPAGATION

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Sugarcane (*Saccharum officinarum*) is a long duration crop of tropical origin. Sugarcane is traditionally propagated using three budded sets at commercial level. Germination percentage of sugarcane is poor and to compensate this very high rate of seed cane around 7-10 tons/ha is used. Seed cost in sugarcane accounts for 20% of production cost which is economically not viable. Bud chip method is more convenient and economical than the conventional method of sugarcane propagation. Bud chips are excised axillary buds of cane which holds great promise in reducing the rate of seed cane and improving the quality of cane. The bud chip technology entails excision of sugarcane bud

with small material of the root band, germinating them in plant media followed by transplanting the seedlings into the main field. Bud chips are less bulky and are easy to transport. It has been reported that a small volume of tissue and a single root primordium adhering to bud is sufficient to ensure proper germination in sugarcane. Using bud chips about 80 % by weight of the seed material can be saved. It has been established that bud chip technology proved to be a low cost technology for exchange of seed material and it can be transported easily in carton boxes for regular varietal development programmes.



DEVELOPMENT OF BUD CHIP TECHNOLOGY

Development of bud chip technology of sugarcane propagation has been inspired by the success of SRI (System of Rice Intensification) under the project of WWF-ICRISAT (World Wide Fund for Nature and International Crop Research Institute for Semi-Arid Tropics). Dr. Biksham Gujja and his team extended the concept of SRI to sugarcane and SSI (Sustainable Sugarcane Initiative) was hatched under the project WWF-ICRISAT 2009. The project was taken up on large scale and farmers from states of Andhra Pradesh, Tamil, Nadu, Maharashtra, Punjab and Orissa were trained on the methodology of raising bud chip seedlings. The project aimed at improving sugarcane cultivation in India. Bud chip method of raising seedlings is one of the 6 principles of Sustainable Sugarcane Initiative (SSI) package. SSI encompasses use of less seed, wide soakings, intercropping, reduction of water use and chemical inputs in sugarcane production.

METHOD OF RAISING BUD CHIPS SETTLEMENTS

1. Select 8-10 month's age freshly harvested sugarcane stalks free from pests
2. Excise the bud using bud chipping device
3. Soak the chipped buds in water or in PGR (Plant growth regulators) solution for 2 hours
4. Treat the chips with fungicide, Bavistin 0.2% for 30 minutes
5. Shade dry the buds for planting
6. Plant the prepared bud chips in plastic trays or poly bags filled with soil mixture of soil, sand and vermicompost in the ratio of 1:1:1
7. Frequently irrigate the chips planted in trays in



- nursery as and when required
8. Investigate the nursery regularly for any incidence of disease/pest
9. Seedlings are ready for transplanting in the main field in 30-35 days after planting in trays
10. Select healthy and disease free settlings for transplanting

ADVANTAGES OF BUD CHIP

- * Significant saving of seed material of around 80%
- * Transportation of seed material is easy as bud chips are less bulky
- * Mechanical damage to seed material is reduced as bud chips can be transported, in cartons, poly bags or any other feasible packaging
- * Bud chips can be handled and stored easily compared to large masses of cane stalks which reduces chance of rapid deterioration thus increasing the viability of buds and their subsequent sprouting
- * Bud chip method is a resource saving technology
- * The left over cane stalk after scrapping off bud chips can be used for making juice, sugar or jiggery
- * Plant mortality rate could be reduced using bud chip technology
- * Considerable saving of seed material makes it more economical method of propagation

FUTURE PROSPECTS

- * Studies are required to explore bud chip viability for long duration storage and its treatment
- * Identifying suitable planting media for raising bud chips in nursery in particular area depending upon availability of resources
- * Suitable planting methods and planting geometry need to be adopted for realising success of bud chips
- * Training programmes and extension work must be conducted for more adaptation of this technology

FIELDS ON FIRE

IMPACTS AND ALTERNATIVES TO CROP RESIDUE BURNING

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INTRODUCTION:

India ranks second worldwide in farm outputs. As per 2018, agriculture employed over 50% of the Indian workforce and contributed 17–18% to country's GDP. With the assembly of crops there is crop residue production in an exceedingly million tones but efficient crop residue management practices are lacking in India. Field burning can effect soil physical, chemical and biological properties or degrade the soil fertility status and also shows drastic effects on environmental conditions. Additionally it causes loss of serious components like nitrogen, phosphorus, sulfur and potassium from the topsoil layer, making the land less fertile and unviable for agriculture for next generations. Removal of the paddy stalk that's still on the sphere is additionally a labour-intensive process.

IMPACT OF FIELD BURNING:

Burning of crop residue has devastative impacts on soil, environment and on whole ecological balance. Global climate change is one amongst most significant and under considerable example of burning waste and left over crop residues.

IMPACT OF BURNING ON SOIL:

Low intensity fires don't cause enough soil heating to produce significant changes to soil physical properties Intense burns may have detrimental effects on soil physical properties by consuming soil organic matter.

Soil porosity can even be reduced by the loss of soil invertebrates that channel within the soil. The impact of fireside on site productivity is additionally related to intensity.

- Fire effects microbial activities within soil and suppress their growth.
- Biodegradation of organic types of Carbon and Nitrogen as stricken with fire.
- Nitrogen begins volatilizing out of organic matter at only 200° C, whereas Ca must be heated to 1240° C for vaporization to occur.

IMPACT OF BURNING ON ENVIRONMENT:

Burning of residues release various toxic compounds to the environment including nitrogen oxides, volatile organic compounds (VOCs), carbon monoxide, and particle pollution. The main adverse effects of crop residue burning include the emission of greenhouse



gases (GHGs) that contributes to the global warming, increased levels of particulate matter (PM) and smog that cause health hazards, loss of biodiversity of agricultural lands, and the deterioration of soil fertility.

1. Crop residue burning significantly increases the quantity of air pollutants such as CO₂, CO, NH₃, NO_x, Non-methane hydrocarbon (NMHC).

2. The PM emitted from burning of crop residues in Delhi is 17 times that from all other sources such as vehicle emissions, garbage burning and industries. As such the residue burning in the northwest part of India contributes to about 20% of organic carbon and elemental carbon towards the overall national budget of emission from agricultural waste burning. Stubble burning in Punjab and Haryana and other meteorological factors pushed Delhi's air quality level down. On October 14, 2019, the air quality index (AQI) in the national capital was at 280, the upper end of 'poor' category, according to the Centre-run System of Air Quality and Weather Forecasting.

3. Impact on Human health: Crop residue burning causes breathing problems, skin related issues and effect the health of living organisms. Burning of Agricultural wastage leads to exposure of harmful gases in air cause eye and skin problems.

• Air pollution in northern India, mainly New Delhi and the neighboring states, is exacting a toll on the health of the residents, highlighting the severity. In northern India crop residue burning is banned by the Indian government in 2015 in Punjab, Haryana and Uttar Pradesh.

ALTERNATIVES OF FIELD BURNING:

Farmers in North India could increase their profits if they stop burning their rice straw and adopt no tillage practices to grow wheat. Alternative farming practices could also cut farmers' greenhouse emissions from on-farm activities by the maximum amount as 78% and helpower pollution.

1. Happy seeder: Punjab Agricultural University (PAU) Ludhiana designed a tractor mounted machine that cuts and incorporated the paddy straw into the soil. Indian Government banned burning of crop residue in Punjab, Haryana and neighboring districts. Happy Seeder could be a viable alternative to standard tillage.

2. PUSA Decomposer: Indian Agriculture Research Institute (IARI), PUSA have found an alternate to stubble burning in north India. This Decomposer is so cheap that each and every farmer However, for

states such as Odisha and West Bengal the claim of zero suicides seems implausible. In Odisha, ground reports of farmer suicides, including data presented in the assembly, do not match NCRB data. Price of one decomposer capsule is simply Rs. 5. This capsule also helps to take care of the moisture of the sector for extended period of your time. 4 capsules are enough for one acre of land to decompose the residues of crops.

3. PAU Super SMS (Straw Management System): This machine will facilitate the in situ stubble management like Happy seeder. PAU SMS may be a unique technology for combine harvesters with cuts, chops and uniform spreading of straw coming after harvesting of crop.

4. Paddy straw cutter cum spreader:-The Punjab Agricultural University has entered into agreement with two industries namely Thind Mechanical Works, Amritsar and Amrik Agricultural Industries, Batala, for commercialization of PAU Cutter cum Spreader technology. The PAU Cutter cum Spreader is low cost and practically applicable technology for cutting, chopping and uniform spreading of paddy straw in combine harvested paddy fields.

5. Speed kompost: A Pune-based agri biotech firm has developed a microbial formulation that can recycle crop residue in the field rather than burning them away and thus help improve soil fertility. Speed Kompost, the microbial solution developed by Kan Biosys contains a cocktail of cellulose degrading, starch degrading, protein degrading bacteria and fungi.

GOVERNMENT POLICIES OR PLANS FOR MINIMIZING STUBBLE BURNING:

1. Indian Government banned Stubble burning openly. Government of Punjab and Haryana have announced a bonus of 2500 to those farmers for controlling stubble burning.

2. Government of UP has decided to set up two biofuel plants ,where farmers can sell their waste stubble for generation of electricity.

3. An incentive of Rs. 100 per quintal for small and marginal farmers who engage in the management of the residue of their non-Basmati variety rice crop in Punjab, Haryana and Uttar Pradesh.

MICROGREENS

SONIYO YOMICHAH

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“Fresh, tiny, crunchy, green, healthy... So many words come to my mind to describe these small leafy vegetables: Microgreens”

My lockdown days were boring like everyone's. Since I travelled from UAE to Kerala, I was asked to stay in quarantine for 14 days initially, then later on more 14 days, a total of 28 days. I seriously didn't want to waste those days. So, I thought gardening would be a better option and started planting my favorite table roses. The print media and broadcast media these days discuss how the whole economy is suffering from COVID-19. During these days the green leafy veggies, which are inevitable in our daily diet may not be easily available, as most of the markets are closed. I myself re-discovered those ingredients, which are far better than those veggies we buy from markets. Which can be grown in our kitchen, that neither requires land nor fertilizers. Until known about the health and nutrient benefits they were mainly used by chefs in high-end restaurants to garnish and add colors and surprising flavors to dishes. However, in this day and age these tiny plants are increasing rapidly in popularity and are starting to find their way to our homemade dishes

Due to their high antioxidant content, incredibly rich nutrients such as vitamins, minerals, carotenoids and fibers, microgreens are considered as functional food- a food that promotes health by boosting immunity. Malnutrition and lack of minerals or

vitamins are the problems faced by all nations. One of the best ways to fight against this phenomenon is a healthy diet that gives you all the micro-elements needed to maintain your body in good health. Microgreens can be a very easy way to help in this search of healthiness. A diet rich in plant-based foods of all kinds has been linked to a reduced risk of many health conditions, such as obesity, diabetes, heart disease, and high blood pressure.

WHAT ARE MICROGREENS?

Microgreens are tiny version of leafy vegetables or herbs which are harvested in its 2 leafy stage, typically 5 to 10 days after germination, when they only measure a few centimeters high. Microgreens are harvested at a very early stage compared to mature vegetables. The seeds and the cotyledons which are coming from them are really dense packages of nutrients. The cotyledons may contain the stored food reserves of the seed. These recently germinated seeds have all the nutrients that the small plants need to grow bigger, so we can say that microgreens actually are little nutrient explosions. They are considered as functional source of food by researchers.



SPROUTS AND MICROGREENS, ARE THEY SAME?

Sprouts are young wet seeds that start to grow, but don't have any leaves. Some call microgreens as cousins of sprouts.

Sprouts	Microgreens
1-2 days of growth	7-10 days of growth
For sprouting, water is the only medium	Can be grown in tissue paper, soil and in water using hydroponics technique.
Can consume the whole sprout	Can consume the leaves, 3-5cm shoots, roots are not generally consumed
More nutrition than mature plant	9 times more nutrients than sprouts because they undergoes photosynthesis
1-3 inches in height	3-7 inches in height

HOW TO GROW MICROGREENS?

I tried all the 3 known methods of growing Microgreens in soil, tissue paper and water. The results show that the microgreens grown in soil was ready to consume at its 5th day, those grown on tissue paper as well as water took some more day like 8-10days. In my method of growing Microgreens, I used one day old sprouts instead of seeds for sowing

HOW TO SPROUT SEEDS?

1. Take the required quantity of seeds
2. Soak them in water for 3-4 hours
3. Drain out the water, close it in a container, otherwise wrap inside a cotton cloth, and keep it for 8 hours or overnight.



DIFFERENT MEDIUMS OF GROWING MICROGREENS



Tissue paper

1. Take a container/tray, 4 tissue papers.
2. Fold 3 tissue papers as it get fixed in the container.
3. Wet the tissues, make sure no water will be standing in the tray.
4. Spread the sprouted seeds, sprinkle some water on the top, you can use a sprayer.
5. Cover the sprouts with the 4th tissue paper and spray some water so the tissue is wet properly and moisture stays inside the container.
6. Close it can keep aside for 2-3days (no sunlight).
7. On 3rd day you can see the seeds germinated and small yellow color leaves out. Now remove the tissue
8. Keep it somewhere as it receives some sort of sunlight for further growth.(top of your refrigerator, desktop, kitchen counter)
9. Water them daily.
10. Now, when they grew of 5-7 inches height, cut using a scissors and consume.



Soil

1. Take a container/tray, potting soil.
2. Spread the soil (1-2 inch height).
3. Spread the sprouts on the top of soil, spread some soil on the top (thin layer)
4. Water it using a sprayer.
5. Make sure to water daily.
6. I harvested horse gram and green gram on the 4th day.
7. Always use a scissors for cutting.



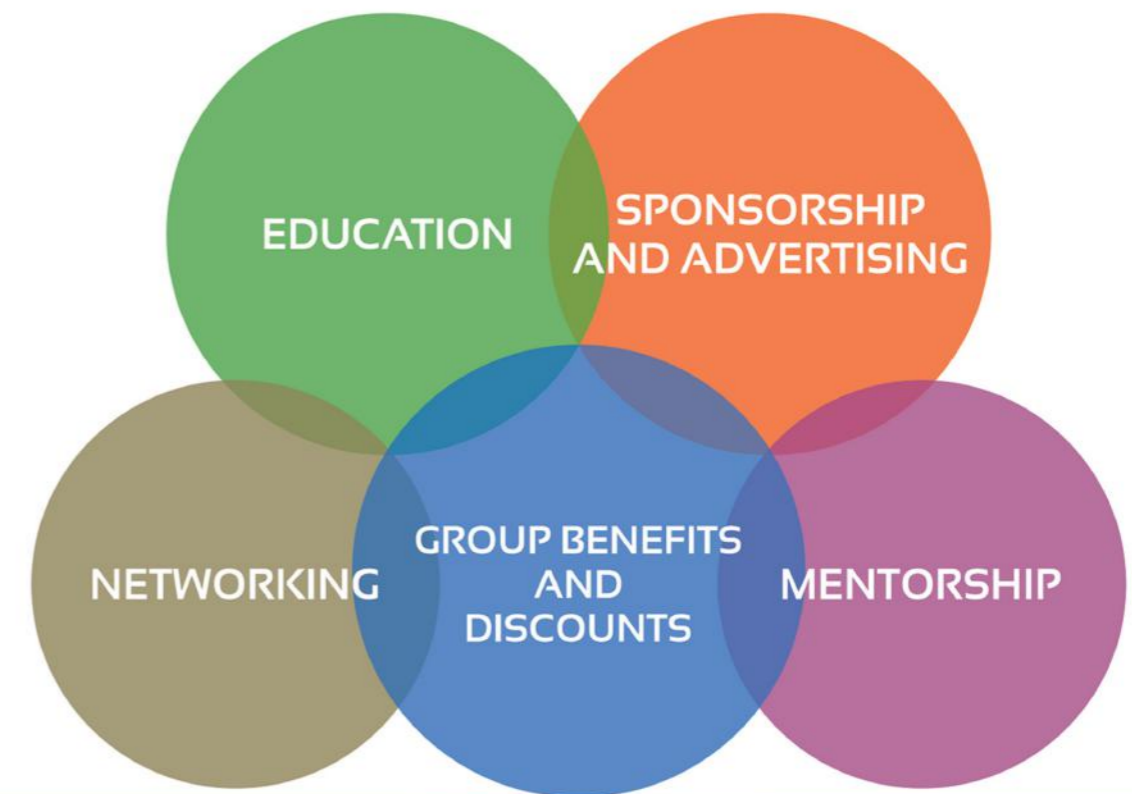
Hydroponics

1. Take 2 containers, as one fits into the other.
2. Make some hole in one , (I used the forks to make holes)
3. Fill water in the other as the base of 1st container touches. Make sure no water is entering the container kept on the top.
4. Wait to see the magical growth (7days)
5. Here you can consume the entire microgreen grown in the technique.
6. Wash before you consume



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ALOE VERA

"AS A NATURAL MEDICINE"

Prince Raj Shukla
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Aloe Vera is a medicinal plant that has been used to treat various health conditions for thousands of years. Now days, Aloe Vera is frequently being used in the field of cosmetology. Though there are various indications for its use, controlled trials are needed to determine its real efficacy. Aloe Vera has various medicinal properties like anti-inflammatory, antibacterial, antiviral, and antitumor which accelerates wound healing and helps in treating various lesions in oral cavity. It also acts as a laxative, beauty enhancer and also maintains the blood sugar. It is commonly known as Barbados or Curacao Aloe, is an herbal medicine with a long traditional use in different cultures. Aloe Vera contains 75 potentially active constituents: vitamins, enzymes, minerals, sugars, lignin, saponins, salicylic acids and amino acids.

The Aloe Vera plant is about one or two feet tall with prickly and bitter leaves, which act as a defense to keep animals and insects from feeding on the plant. The leaves hold a gooey translucent gel, also extremely bitter and known all over the world for its unbelievable healing properties. This translucent gel is made up of around 96% water, some organic and inorganic compounds, a type of protein which contains 18 of the 20 amino acids found in the body and lastly, Vitamin A, B, C and E. Another part of the Aloe Vera plant which is used is the 'sap', a yellow-coloured liquid stuck to the skin of the plant from inside. When dried and purified, the powdered aloe is often used as a laxative. One of the most crucial elements found in Aloe Vera gel is a complex carbohydrate known as Acemannan. It allows nutrients to reach the cells, nourish them and at the same time relieve them of toxins. Ayurveda, Chinese herbal medicine and British herbal medicine

have all advocated Aloe Vera as a healer, when applied or consumed orally.

Aloe Vera also bloom while Aloes begin life as small rosettes resembling flowers, these are actually made up of leaves. Aloe flowers are not often formed in interior situations, but you can give the plant some special care and exposure to encourage blooming on mature plants. There are over 400 species in the family Aloe, with Aloe Vera one of the most popular forms. These easy to grow succulents tolerate a range of light neglect and thrive in well-draining, gritty soil, full sun and regular water.



Aloe plant blooms rise from an inflorescence which soars above the attractive rosettes. Only mature plants of at least 4 years of age will bloom, so if there is no flowers on Aloe plants, it may simply be due to the plant's age. It could also be due to cultural issues which are easily corrected and could result in your Aloe presenting you with its lovely flowers. Aloe Vera is one of the most popular interior plants. Over time, smaller rosettes of leaves will form which can be pared away from the parent plant and grown individually. In cooler climates, the plants exposure to heat and light may minimize its ability to produce flowers. The inflorescences are reminiscent of Red Hot Poker plants, with tubular yellow and orange blooms dangling in a cluster atop a stiff flower stalk. Flowering Aloe Vera plants need the same cultural care as those not in blooms. Remove the spent flower stalk once all petals have dropped.



STUDIES SAYS:

In 2014, a study published online by the Cambridge University Press looked at tomato plants coated with aloe gel. The report showed evidences that the coating successfully blocked the growth of many types of harmful bacteria on tomato. Similar results were found in a different study with apples. This means that aloe gel could help fruits & vegetables stay fresh and eliminate the need of dangerous chemicals that extend the shelf life of produce.

SOME OF THE PROMINENT BENEFITS OF ALOE VERA ON SKIN

There are so many benefits of Aloe Vera to skin. As Bill C. Coats wrote, "Since the skin needs nutrition of its own, Aloe Vera, when formulated into a properly designed personal care regimen, can treat, exfoliate, restore, reveal and provide constant, impressive nutrition to the human skin."

* The slimy texture of natural Aloe Vera gel is very soothing and cooling and it's for these exact reasons that Ayurveda refers to Aloe Vera as the miracle herb that can be used to treat wounds, minor cuts, dry skin and severe burns.

* A lot of Aloe Vera based products are available in market like Aloe sanitizer, hand wash, face wash, face packs and many more products which we can utilize in our daily life.

CONCLUSION:

Aloe Vera has a range of therapeutic properties, especially as an ointment for the skin. One can use aloe products to treat a medical condition on the recommendation of a doctor. We can use commercial Aloe Vera products or sometimes we can directly take it from the leaf of an aloe plant. Aloe Vera plant has immense medicinal properties and it is like a God gift to mankind and our responsibility is to conserve it for our future

ROLE OF EMOTIONAL INTELLIGENCE IN VETERINARY SCIENCE

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Emotional intelligence refers to an individual's ability to become aware of one's emotions along with other person's feeling at specific moment and then using this information for self management and management of relationship with others. This can be attained by consortium of four pillars: self-awareness, self-management, social awareness and relationship management. Emotions need to be on both sides in veterinary profession which require interest of doctor in treating patient and faith/trust of animal owner in doctor. All are exposed to emotional situation one or the other time. In time of stress, clients are anxious and look forward for compassion, empathy and understanding from the other person. One needs to develop emotional along with social intelligence for success in veterinary profession.

Emotional intelligence leads to various advantages in personality development of individual. Communication is improved with better empathy, stress reduction, improved relations, better self-management with enhanced leadership skills which are important for success in any field. Self-awareness is also noted which is important for self-assessment. In today's competitive world one should acquire above qualities for being successful.

Research is in process to examine how cognitive abilities or consciousness are used by animals using artificial intelligence. Emotionally intelligent animals in decreasing order are believed to be: dolphins, elephants, red foxes, bee, rats, pigeons and dogs. Animals whether fish or elephant do think, acquire knowledge, memorize, perceive senses, recognize individuals and languages. They do perceive the presence of individual in their proximity and show their feelings. It has been reported that fish after recognizing, associate with individuals. The mental power of humans and animals differ only in degree and both attribute emotions. Book titled Animal Liberation authored by Peter Singer, an Australian philosopher brought above facts into public domain and led to formation of foundations for animal rights. Earlier intelligence was explored in primates which is considered closest species to humans. Kanzi (bonobo) was found to communicate through lexigrams which are symbols representing words, Koko (gorilla) used sign languages and Ayumu (chimpanzee) with amazing memory. Vertebrates have ability in expressing

emotions. Dingoes which are pests attacking livestock have been found to be highly sentient and intelligent animal. Whenever sickness or death took place after consumption of baited meat, older members of dingo packs in future avoided baits and also taught young one to do similarly sensing danger. Animals also are considered to have consciousness, so they can plan act based on memories. Feeling of affection/emotions can be well noted through behavior of dogs and horses which are considered most faithful to owner.

Animals do have emotions and feel pain. Surrounding awareness significance can be noted in livestock in abattoir. Veterinarian behavior does affect animal response. If doctor is handling animal quietly and with calmness, animal moves well right to stunning point before being slaughtered. But in case of rough handling, animal vocalizes with alert alarm for animal behind them to foresee danger (animal may release pheromones in urine and saliva). Social animals are good communicators using subtle signals. Fishes are no exception. Fishes and sharks also respond to pain. Dolphins, elephants and primates recognize death.

In one case, death of pup of dingo took place due to snake bite. In about 30 minutes pup breathed last and during this time its mother and every sibling interacted through sniffing, pawing and whimpering. Later mother dingo could be seen protecting its pup body by picking it up in its mouth and keeping close to family by repeated movement. RI scans can be used to study brain activity as a response to stimuli. Dogs and cats are found to be the most common emotional support animals for humans. Dogs can express emotions on its face or through cocked head and activities like wagging or dropping tail, whining or barking. The ways of human's interaction with animals is of prime importance. Recognition of intelligence, sentience and emotions in animals has helped in stopping annual mass killings mainly of dolphins in Japan, whaling and in creating awareness for protection of species from being getting extinct.

WHY NEED FOR EMOTIONAL INTELLIGENCE:

Emotional quotient enhancement helps in both profession and personality development. It has been found that 90% top performers possess high emotional quotient and 58% of our job performance is dependent on emotional quotient. Moreover people having high emotional quotient has significantly higher earnings compared to others. Individuals with high emotional intelligence have control on their mood and understand effect on others. People with poor emotional intelligence become easily frustrated

abusing the animal to be treated. Frustration and stress need to be counteracted properly for successful management of self and relations. Reference checks, behavioral interviewing and setting expectations and consequences are must to study emotional intelligence in individual. Role modeling, training and coaching (for recognition, relaxation and reframing) is must for positive emotional intelligence and correcting problem behavior.



SMART FARMING

TECHNICAL INNOVATION IN FARMING

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INTRODUCTION

Smart Farming is a concept of farming management using modern Information and Communication Technologies to increase the quantity and quality of products. The Third Green Revolution is taking over the agricultural world based upon the combined application of ICT solutions such as precision equipment, the Internet of Things (IoT), sensors and actuators, geo-positioning systems, Big Data, Unmanned Aerial Vehicles (UAVs, drones), robotics, etc. Farmers in the 21st century have access to GPS, soil scanning, data management and Internet of Things technologies. The world will need to produce 70% more food in 2050 than it did in 2020 in order to feed the growing population of the Earth, according to the UN Food and Agriculture Organization. To meet this demand, farmers and agricultural companies are turning to the Internet of Things for analytics and greater production capabilities.

- Among the technologies available for present day farmers there are sensing technologies, including soil scanning, water, light, humidity and temperature management
- Software applications — specialized software solutions that target specific farm types
- Communication technologies such as cellular communication
- Positioning technologies, including GPS
- Hardware and software systems that enable IoT based solutions, robotics and automation
- Data analytics, that underlies the decision making and prediction processes

APPLICATION OF IOT IN AGRICULTURE



PRECISION AGRICULTURE:

Popular definitions of Precision Agriculture (PA), Satellite Farming or Site Specific Crop Management (SSCM) describe the term as “a technology enabled approach to farming management that observes, measures, and analyzes the needs of individual fields and crops”. The development of precision agriculture is shaped by two trends: “Big Data and Advanced Analytics Capabilities and Robotics, aerial imagery, sensors, sophisticated local weather forecasts”. The biggest difference from the classical approach is that precision farming allows decisions to be made per square meter or even per plant/animal rather than for a field. In simple words farming that collects and uses data of plots for managing and optimizing the production of crops is known as Predictive farming. It is predicted that in the next ten years, nano-technology led application will play a critical in agriculture.

Agriculture drones:

Drones can be put to excellent use in the agricultural industry. Typically, there are two types of drones namely, ground-based and aerial drones. Since drones collect multispectral, thermal, and visual imagery during the flight, the collected data provide farmers with insights into plant health indices, plant counting and yield prediction, plant height measurement, canopy cover mapping, field water pond mapping, scouting reports, stockpile measuring, chlorophyll measurement, nitrogen content in wheat, drainage mapping, weed pressure mapping and so on.

Smart Greenhouses:

Smart greenhouse is a step ahead of the regular greenhouses. In these setups, the microclimate is controlled and monitored to ensure optimal plant growth. Greenhouse Monitoring Software that supports this capability includes Growlink, Farmapp and Green IQ.

Livestock Management:

There are specialized sensors for livestock management that can be attached to every livestock animal on the farm. These sensors collect data about animal health and maintain a log of the performance. Smart Farming techniques, enable farmers to better monitor the needs of individual animals and adjust their nutrition correspondingly, thereby preventing disease and enhancing herd health.

Crop Water Management:

In order to perform agriculture activities in efficient manner, adequate water is essential. Agriculture IoT is integrated with Web Map Service (WMS) and Sensor Observation Service (SOS) to ensure proper water management for irrigation and in turn reduces water wastage.

Integrated Pest Management or Control (IPM/C):

Agriculture IoT systems assures farmers with accurate environmental data via proper live data monitoring of temperature, moisture, plant growth and level of pests so that proper care can be taken during production.

Food Production & Safety:

Agriculture IoT system accurately monitors various parameters like warehouse temperature, shipping transportation management system and also integrates cloud based recording systems.

BENEFITS OF USING IOT IN AGRICULTURE:

- The effective use of inputs helps in reducing wastage and thus, decreases costs incurred.
- Losses due to diseases and infections can be reduced, by continuous and real-time crop monitoring.
- The use of water can be optimized, which in turn shall reduce water wastage.
- The use of IoT-based devices allows better management of farm activities.
- With IoT, various factors would also lead to the protection of environment.

CONCLUSION:

Smart Farming applications do not target only large, conventional farming exploitations but could also be new levers to boost other common or growing trends in agricultural exploitations, such as family farming (small or complex spaces, specific cultures and/or cattle, preservation of high quality or particular varieties, organic farming and enhance a very respected and transparent farming according to European consumer, society and market consciousness. Smart Farming can also provide great benefits in terms of environmental issues. For example: Through more efficient use of water or optimization of treatments and inputs.



UNDEREXPLOITED LEAFY VEGETABLES

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Leafy vegetables also called as leafy greens in which leaves are eaten as vegetables. They are an important part of a healthy diet. They are full with vitamins, minerals and fiber but low in calories. Diet rich in leafy vegetables offer various health benefits including reduced risk of obesity, heart disease, high blood pressure and mental decline. Leafy vegetables ensure beautiful skin and hair as they are good source of vitamins. Dark green leafy vegetables are good sources of many vitamins (such as vitamins A, C, and K and folate) and minerals (such as iron and calcium) including fiber. The recommended dietary allowance of leafy vegetables for adult varies 100g to 125g per day. But the availability is very less. There are few leafy vegetables such as amaranthus, basella, palak, spinach and fenugreek which are cultivated commercially in India. Beyond these many more leafy greens are consumed locally in various parts of country and its cultivation is limited. Such greens highly beneficial and have nutraceutical properties. These greens should be popularised among the consumers for further cultivation and improvement.

Alternanthera sessilis

It belongs to family Amaranthaceae. It is commonly known as sessile joy weed and dwarf copperleaf. It is used as vegetable especially in Sri Lanka and some Asian countries. In India it is mainly found in West Bengal, Assam, Andhra Pradesh, Tamil Nadu, Karnataka and Odisha. The leaves, flowers and tender stems are consumed as vegetables. The plant has several medicinal properties including diuretic, cooling, tonic and laxative properties. It has been used for the treatment of dysuria and haemorrhoids. In some part of the country the plant is also believed to be beneficial for the eyes, and is used as an ingredient in the making of medicinal hair oils.



Commelina benghalensis

This plant belongs to family Commelinaceae. It is commonly known as the Benghal dayflower, tropical spiderwort, or wandering Jew. Plant is a perennial in nature and native to tropical Asia and Africa. In China it is used as a medicine that is considered to possess diuretic, febrifugal and anti-inflammatory effects. In Pakistan it is used against leprosy and skin diseases. In India the leaf is used as vegetable in some parts of Odisha and West Bengal. In some parts of the country it is regarded as famine food. The plant is characterized by its attractive and little bluish-violet flowers. Leaves are oval and elliptic or in some plants, it appears oblong, slightly triangular, dark-bright green in color and almost about 4-7 cm in length.

Glinus oppositifolius

It belongs to Molluginaceae family. The plant species is found in India and Bangladesh. It is a non cultivated vegetable. The plant has several medicinal properties such as anthelmintic and free-radical scavenging potential, hypoglycemic and hypolipidemic effect, antioxidant activities, analgesic and anti-inflammatory potential and hepatoprotective activity and antiprotozoal activity. It is used to treat joint pain, inflammation, diarrhoea, intestinal parasites, fever, and malaria.



Ipomea aquatica

It belongs to family Convolvulaceae and supposed to be originated in China. The plant is distributed in Asia, Africa and Australia. It is an aquatic or semi-aquatic, trailing or floating herbaceous plant. Leaves are elliptic or ovate to oblong; flowers are white or pale purple, solitary in nature. Young leaves and shoots are used as vegetables. Leaves are rich source of vitamins, minerals and fiber. The plant contains various essential amino acids, carotenoid and flavonoids. It has antioxidant property and very suitable for healthy diet.



Emilia sonchifolia

It belongs to family Compositae. The plant is commonly known as lilac tassel flower or cupid's shaving brush, is tropical flowering specie. It is spread in tropical regions around the world and native to Asia. In India it is found in the eastern and southern states. In India it is used in folklore medicine, against inflammation, rheumatism, cough, cuts and wounds. In China, the leaves were used in fever and dysentery. It is also used as an analgesic agent and antibiotic. Plants show antioxidant, antitumor and anticarcinogenic properties. In Kerala it is considered as one of the sacred flower. The leaves and young shoots are used as vegetables.



Centella asiatica

The plant belongs to Umbelliferae/Apiaceae family and commonly known as Gotu Kola, Asiatic pennywort, Indian pennywort or Spade leaf. The young leaves are used as vegetable in India, China, Sri Lanka and Africa. The plant possess several medicinal properties such as heparoactive, anticancerous, anti-diabetic, anti-depressant, wound healing, anti-oxidant, neuroprotective, anti-inflammatory, anti-fungal and anti-bacterial. The leaves, 1-3 from each node of stems, long petioled, 2-6 cm long and 1.5-5cm wide, orbicular-renniform, sheathing leaf base, crenate margins, glabrous on both sides Fig. A. Flowers are in fascicled umbels, each umbel consisting of 3-4 white to purple or pink flowers, flowering occurs in the month of April-June.



FARMERS SUICIDE IN INDIA

Ayush Kumar

FARMER SUICIDE

As per statistics by Government of India, over 12,000 suicides were reported in the agricultural sector every year since 2013. The report states that “a total of 12,602 persons involved in farming sector - 8,007 farmers-cultivators and 4,595 agricultural labourers - committed suicide during 2015, accounting for 9.4% of total suicide victims (133,623) in the country.” Maharashtra topped the list with 4,291 suicides, followed by Karnataka, Telangana, Madhya Pradesh, Chhattisgarh, Andhra Pradesh and Tamil Nadu with 1,569, 1,400,

1,290, 954, 916 and 606, respectively. Together, these seven states accounted for 87.5% of total suicides in the farming sector in the country i.e., 11,026 of 12,602. In 2014, 12,360 persons in the farming sector i.e., 5,650 farmers and 6,710 agricultural labourers committed suicide, accounting for 9.4% of the total number of suicides (131,666) in the country. In 2013, the number was 11,772, accounting for 8.7% of the 134,799 suicides in the country

The ultimate sign of distress is suicide. Amid the ongoing rural distress, reports of farmer suicides are often used to highlight the plight of rural India. However, new data and research suggest that farmer suicides may not have increased in recent years and may have more complex causes than falling incomes or rising indebtedness.

According to the 2018 National Crime Records Bureau (NCRB) data, the rate of farmer suicides in India has decreased over the last few years. This decrease comes even as overall suicide rates remained fairly constant and rural poverty shot up. In 2018, there were 10.2 suicides for 100,000 Indians, largely in line with the World Health Organization's estimates of global suicide rates, but 3.6 suicides for 100,000 farmers and farm labourers.

FARMERS SUICIDE IN INDIA: REASONS

Scholars have given various reasons such as monsoon failure, climate change, high debt burdens, government policies, mental health, personal issues and family problems among the reasons of in India. Some of these reasons are explained as under:

1.The surge in input costs: A major cause of the farmer's suicides in India has been the increasing burden on the farmers due to inflated prices of

agricultural inputs. The culmination of these factors is seen in the overall increase in the cost of cultivation, for wheat, the cost at present is three times than it was in 2005. The input costs consists of following costs:

- Cost of chemicals and seeds
- Costs of Agricultural equipment

2.Labour costs: Likewise, hiring labourers and animals is getting costlier too. While this may reflect an improvement in the socio-economic status of the labourers, driven primarily by MGNREGA and hike in minimum basic income, this has not gone too well with boosting the agriculture sector.

3.Distressed due to loans:

•NCRB data points out that in 2474 suicides out of the studied 3000 farmer suicides in 2015 the victims had unpaid loans from local banks. This is clear enough an indication for drawing correlations between the two. Moreover, a shift away from usual trend also revealed that of the loans taken by these farmers, only 9.8% were loans from money-lenders. Thus the pressure or muscle-power of money-lenders could be far from being a major driving force, as is otherwise perceived. Another source of strong linkages between farmer suicides and indebtedness is reflected from the spread of the two. While Maharashtra had 1293 suicides for indebtedness,

Karnataka had 946. Note that both these states saw one of the highest incidences of farmer suicides as well as indebtedness.

4.Lack of direct integration with the market: Although initiatives like the National Agricultural Market and contract farming are helping integrate the farmers' produce directly with the market, cutting the role of intermediaries, the reality is still lagging behind.

5.Lack of awareness: The digital divide, as well as the literacy gap, has made the marginal and small farmers particularly vulnerable due to their inability to utilise the positives of government policies.

6.Water crisis: The concentration of these suicides in the water-deficit regions of states like Maharashtra, Karnataka is a manifestation of how the water crisis and thereby failure to meet production demands have intensified the menace. This is particularly true in the backdrop of continued failed monsoons.

•Interstate water disputes: What has added to the already prevalent crisis is the unwillingness to cater to each other's water needs amongst the states. A case in point is the recently resurfaced Kaveri dispute that saw Karnataka and Tamil Nadu battle out water shortage both in and outside the tribunal even to the extent of non-compliance with the tribunal award.

7.Climate change has acted as the last nail in the coffin by resulting in furthering of the uncertainties associated with the already uncertain monsoon system and hence agricultural production. While incidents like flash floods have led to crop losses, deferred monsoons have seen production shortfall year-in and year-out

8.India's urban consumer driven economic policies: The political economy of India is driven more by the urban consumers than the rural producers. This is reflected in the urgency to impose



price controls in case of price rise (imposing Minimum Export Prices, bringing items under Essential Commodities etc) and a lacklustre withdrawal once the price is under control. Contrast this with how we have been imposing minimum import price to secure our steel sector. This differential treatment to primary sector also limits profit margin and thereby hinders farmers' chances of breaking free from the cycle of indebtedness.

9.Loan waivers instead of restructuring, re-investment measures: Our approach of handling

farmer indebtedness and hence farmer suicides has been appeasement politics like the recent move by the UP government to waive off Rs 36000 crore worth of loans. Surprisingly this comes at a time when agricultural yield is expected to be better in the wake of a good monsoon.

In essence, the factors sum up to crop failure, unsustainable production and subsequent farmer indebtedness leading to failure of strengthening the economic state of the farmer as the driving force behind these suicides.

FARMERS SUICIDE IN INDIA: STATISTICS

National figures though mask the significant variation in farmer suicide rates across states. Karnataka, Maharashtra and Kerala reported the highest suicide rates in 2018, as per NCRB data. A 2014 study of farmer suicides between 1997-2012 had placed these three states among those with a major problem regarding farmer suicides. The study also classified a group of states that have had little problem with farmer suicides historically. This group included Punjab but that seems to have changed in recent years. Among the major agrarian states, Punjab has experienced a sharp jump in farmer suicides with more than a five-fold increase. Some states seem to barely have a farmer suicide issue, the NCRB data suggests. In 2018, six states, including Bihar, Odisha and West Bengal reported zero farmer suicides. However, for states such as Odisha and West Bengal the claim of zero suicides seems implausible. In Odisha, ground reports of farmer suicides, including data presented in the assembly, do not match NCRB data.

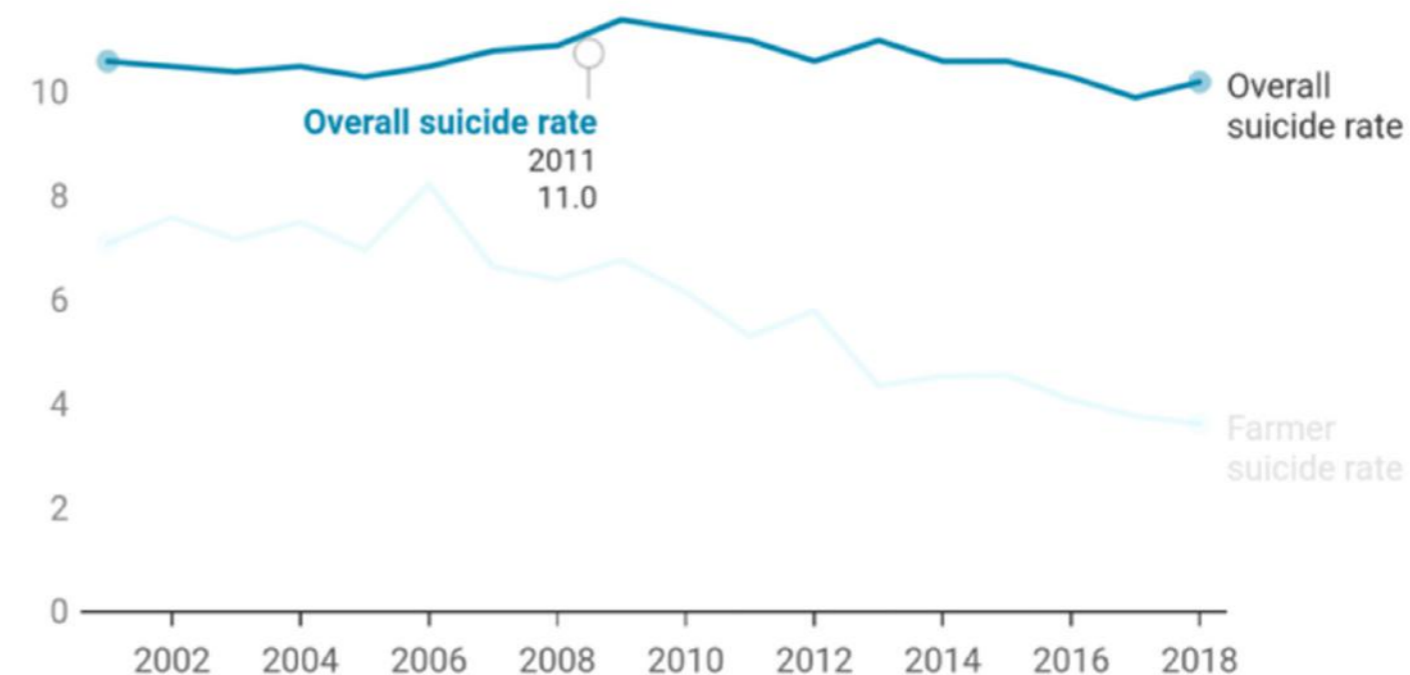
A better way to understand farmer suicide data is to compare it with the overall suicide rate in the states. In some states, such as Karnataka and Maharashtra, both general suicides and farmer suicides seem to be more common. Conversely, other states, such as Bihar and Uttar Pradesh, have tended to report both lower overall suicide rates and farmer suicide rates in recent years. But there is a significant gap between overall suicide rates and farmer suicide rates in a few states. For instance, West Bengal reported a high overall suicide rate and has a history of farmer suicides, but reported zero farmer suicides in 2018. Punjab and Mizoram are the only states where the farmer suicide rate actually exceeded the overall suicide rate.

In 2014, around 9.4% of all national suicides were classified as farmer suicides. By 2018, this figure had fallen to 7.7%. One group that has seen a sharp rise in suicides is daily wage earners. In 2014, daily wage earner suicides accounted for just 12% of all of India's suicides, but by 2018 this had risen to 22%. This was the biggest increase among all the professions tracked by NCRB.

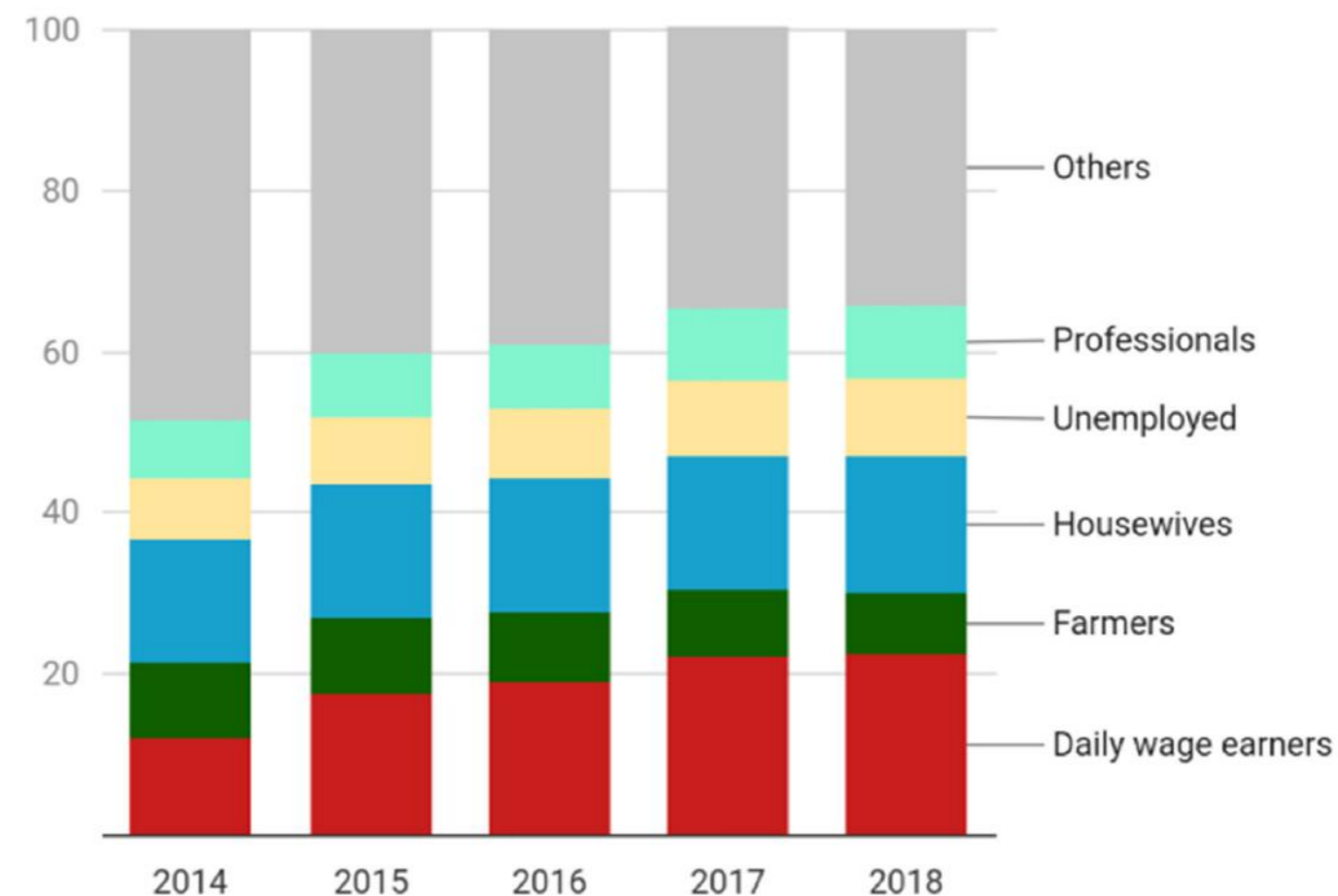


Farmer suicide rates have decreased steadily over the last decade

Suicide rate (suicides per 100,000 population*)



Share of total suicides across India



IMMUNITY BOOSTING AND MICRONUTRIENTS: AN ASPECT TO PAY ATTENTION

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ABSTRACT:

Nutrition is an important aspect to allow all the cells in our body to function properly, including the cells in immune system. Immune system plays an important role in fighting against diseases. The possible response of immune system against body cells is called auto immune reaction. No single food can be described as superfood that can tend to increase immunity. It is always the balanced intake of all micro and macro nutrients from all five food groups that can help to build healthy immune system. Therefore, we must include biologically valuable proteins, energy giving foods, micronutrients and antioxidants in our daily diet to provide protection.

INTRODUCTION:

A better understanding of the role of nutrients in immune function will facilitate the role of nutrition to improve human health. Nutrients may impact directly or indirectly upon immune cells causing changes in their function or may exert effects via changes in the gut microbiome. Cells of immune system must be able to distinguish self from non-self and furthermore discriminate between non-self molecules which are harmful and innocuous. Cells of immune system may be divided into those of innate and those of adaptive immune response. The innate response is the first response to an invading pathogen. The innate response is rapid but not specialised and is generally less effective than adaptive immune response. The adaptive immune response has the ability to specifically recognize a pathogen and remember it if exposed to it again. T-cells are critical in antigen recognition and the coordination of the immune response. Broadly they are divided into cytotoxic T cells and the T helper cells.

Cytotoxic T cells are involved in killing of infected damaged cells and tumour cells. T helper cells (Th), Th1 cells produce interferon gamma (IFN- γ) and

interleukin (IL)-2 which are important in antiviral and cellular immune responses. Th2 produce IL-4, IL-5 and IL-3 which are involved in humoral (antibody) and anti parasitic responses.

The Th1 cells produce IL-17 A, IL-17 F and IL-22 which are important in fighting bacteria and fungi. The other lymphocytes of the adaptive immune system are the B cells which are responsible for antibody or immunoglobulin (Ig) production. Like T cells, B cells respond specifically to an antigen. They can differentiate into short lived plasma cells which produce one of the five classes of Ig (IgM, IgD, IgG, IgA and IgE). Each class of Ig has specialized role.

ROLE OF MICRONUTRIENTS IN IMMUNITY AND GENERAL WELL BEING

Vitamin C: Since Vitamin C is a powerful antioxidant it has antibacterial and anti inflammatory effects against pathogens. It also stimulates the production of antibodies and white blood cells that prevent disease. Rich sources include amla, guava, green chillies and all citrus fruits

Vitamin E: Vitamin E is also a potent antioxidant known to improve immune functions. Higher concentrations of Vitamin E are found in immune cells compared to other cells in the body. Vitamin E also regulated number of natural killer cells that prevent viral infections. To have Vitamin E in body eat plenty of nuts and seeds like almonds, hazelnuts, pistachios, pumpkin seeds and cashews.

Vitamin A: For rich sources of Vitamin A non vegetarian foods are good as it is a fat soluble vitamin. Apart from this beta carotene which is a precursor of Vitamin A is found in all yellow and orange coloured fruits and vegetables. Although we associate Vitamin A deficiency with night blindness and conjunctiva but it has major role to play in maintaining epithelial cells of our body. Vitamin A is also known to enhance immunity by regulating antibacterial and anti-inflammatory immune responses to infectious diseases like tuberculosis, pneumonia, malaria and herpes.

Vitamin D: Vitamin D is a fat soluble vitamin, different from others in that a major source is derived from UV light-induced conversion of its precursor under the skin. Dietary sources include fortified foods and supplements. Vitamin D deficiency may affect the immune system as Vitamin D plays an immune-modulation role, enhancing innate immunity by upregulating the expression and secretion of antibacterial peptides. Recent researches have suggested that Vitamin D has a potential role in prevention of acute respiratory infection by increasing immunity. It was observed that low Vitamin D level in blood is associated with increased incidence of respiratory tract infections.

Iron: Iron is essential for almost all living organisms and takes part in a number of important biological processes. Its ability to switch between multiple oxidation states makes it an important co-factor in electron transfer and oxidation-reduction reactions, and also allows it to interact reversibly with other atoms, especially oxygen, sulphur and nitrogen. Iron is a fundamental element for normal development of

the immune system. Its deficiency affects the capacity to have an adequate immune response. The role of iron in immunity is necessary for immune cells proliferation and maturation, particularly lymphocytes, associated with the generation of a specific response to infection. The body has the capacity to reduce the iron availability to be consumed by infectious elements by proteins such as transferrin and lactoferrin. Also, iron is essential for the proliferation of bacteria, parasites, and neoplastic cells. Thus, excess iron could potentially facilitate the development of infections and the invasion of tumoral cells.

Zinc: The micronutrient zinc is important for maintenance and development of immune cells of both the innate and adaptive immune system. A disrupted zinc homeostasis affects these cells, leading to impaired formation, activation, and maturation of lymphocytes, disturbed intercellular communication via cytokines, and weakened innate host defence via phagocytosis and oxidative burst.

Selenium: As an antioxidant, selenium reduces inflammation and prevents cellular damage caused by free radicals, thereby reducing the risk of chronic diseases. Selenium also has powerful antiviral effects against respiratory infections like influenza and asthma. In high concentrations, it can also inhibit the spread of cancer cells. Selenium can be found in a variety of foods including beans, nuts, legumes, fatty fish, unprocessed dairy products, fruits, plain yogurt, whole grain oats, mushrooms, seeds and barley.

CONCLUSION:

Considering the high prevalence of micronutrient deficiency among all age groups, there is a need to enhance the availability, access and utilization of locally available foods rich in micronutrients. Addressing micronutrient deficiencies is a public health concern worldwide and also an individual's take on how to eradicate deficiency from their home, city, country and world.

IMPACT OF COVID-19 PANDEMIC ON FOOD INDUSTRIES

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The outbreak of coronavirus has had significant impact not only on public health worldwide, but also on all stages of the supply chain and value chain of various industries. In fact, according to Fortune.com, about 94% of Fortune 1,000 manufacturers are being hit with disruptions as a result of the coronavirus. The food and beverage is one such industry that is currently experiencing impacts due to outbreak, which was declared a pandemic by World Health Organization (WHO) on 11 March 2020. The epidemic is largely contained in China and accounts for the highest number of cases. The greater significance of this with food industry is associated with the fact that China is among the largest markets for Food and beverage imports and exports for many countries. Globally, the food and beverage industry is expected to experience the differential impact of this rapid spreading COVID-19 on each stage of its value chain through the mediums of the affected workforce at industrial level. Raw material supply (agricultural produce, food ingredients, intermediate food products), trade and logistics, demand-supply volatility and uncertain consumer demand at foodservice outlets-among other factors. The affected workforce in agricultural farms, food and beverage production & processing plants and distribution network are analysed to run the risk of promoting the outbreak of COVID-19, the transmission of which can occur during various activities of co-ordination.

IMPACT OF COVID-19 ON FOOD SECTOR :

The food industry is bracing for major adjustments as concerns over the spread of the coronavirus grow. Companies are adjusting their operations to meet increased demand. The food Marketing institute and National Restaurant Association are among industry associations that have issued information about how retailers and foodservices operators can cope with the outbreak. So basically food security and livelihood are most at risk due to the pandemic.

Currently, some 820 million people around the world are experiencing chronic hunger- not eating enough caloric energy to live normal lives. Of these 113 million are coping with acute severe insecurity- hunger so serve that it poses an intermediate threat to their lives or livelihoods and renders them reliant on external assistance to survive. Vulnerable groups also include small-scale farmers, pastoralists and fisheries who

might be hindered from working their land, caring for their livestock. They will also face challenges accessing markets to sell their products or buy essential inputs, or struggle due to higher food prices and limited purchasing power. Informal labour will be hard hit by job and income losses in harvesting and processing. The food supply chain is a complex web that involves producers, consumers, agricultural and fishery inputs, processing and storage, transportation and marketing etc. global cereal stock are at comfortable levels and the outlook for wheat and other major staple crops for 2020 is positive. Blockages of transport routes are particularly obstructive for fresh food supply chain and may also result in increased levels of food loss and waste. Fresh fish and aquatic products, which are at highly perishable and therefore need to be sold, processed or stored in a relatively limited time and at particular risk.



EFFECT OF PANDEMIC ON FOOD DEMAND: IMPACT OF CORONA VIRUS ON FOOD AND BEVERAGE INDUSTRY:

At the onset of the covid-19 outbreak there has been significant increase in demand. Food demand is generally inelastic and its effects on overall consumption will be likely limited although dietary patterns may alter. Fear of contagion can translate in reduced visits to food markets. A surge in sales of shelf-stable foods and beverages in the United States may boost profits for some food manufacturers and retailers in the near term. Sales of powdered milk products surged 84% during the last week of February, according to Nielsen. Sales of staples like bread and eggs along with rice, beans and frozen foods also have increased as consumers rush to stock their pantries. The pandemic has also affected food business around colleges. The trend of street food, cafes, shops around colleges are stable because of the students but because of this situation all these are shut down and it is having negative impact on the shopkeepers. So I found this catchy slogan on Google that says "Consumers goods fly off the shelf as coronavirus spreads in India" and that's the truth as deliveries are delayed and some items such as sanitizers have gone off shelves or are unavailable online. Products such as rice, atta, pulses, sugar, biscuit, tea, instant noodles, butter and frozen food are flying off the shelves in Mumbai, Delhi- NCR, and Pune.

The disruption to supply chains means that farmers are unable to get their products to market. At the beginning of closing down everything and the announcement of the lockdown, there was a high demand of Food and Beverage storage. The Food and Beverage Industry face reduction in visit to Food markets due to the fear of Contagion. Food and Beverage Industry is facing a reduced customer behavior and demand because of the cut down in outside food, Dine-out and out of home consumption of food.

COVID-19 ON DAIRY INDUSTRY:

Due to Coronavirus the disruption to supply chain is causing tons of fresh produce to be wasted. Despite food shortages and high demand for dairy products, the Dairy Farmers were asked to dump their milk. The short shelf life and perishable nature of dairy products, means the effects of Coronavirus have hit them harder and faster than agriculture industries.

CONCLUSION:

Strong global concerns about the pandemic coronavirus have largely but negatively influenced the global functioning of the food and beverage industry and the mindset of consumers, given the health risks. Further to the above-mentioned factors and on the economic and on the economic front, although prices of F&B products and agricultural produce have remained stable, prolonged outbreak of COVID-19 will lead to economic instability and food inflation. While the short-term impacts are more evident, it is yet to be understood what impacts and what magnitude of impact the outbreak of COVID-19 will have on the supply chain in the long term.

MINERAL MIXTURE IN ANIMAL FEED FOR BALANCE NUTRITION AND ENHANCED ANIMAL PRODUCTIVITY

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INTRODUCTION

Minerals are vital components of animal nutrition which required by dairy animals for their metabolic functions, growth and development, higher milk production, reproduction and health. There are fifteen minerals which are essential in the animal system for proper health and functioning of animal body. Out of these fifteen elements, seven are major (Calcium-Ca, Phosphorus-P, Sulphur-S, Sodium-Na, Magnesium-Mg, Chlorine-Cl and Potassium-K) and eight are trace elements (Iron-Fe, Copper-Cu, Cobalt-Co, Manganese-Mn, Molybdenum-Mo, Iodine-I and Zinc-Zn). Animal cannot synthesize minerals inside its body and usually feeds and fodders fed to the dairy animals do not provide all the minerals in the required quantity. Therefore, animals should be provided with adequate and balanced amount of good quality minerals in their ration. Supplementation of bio-available minerals through mineral mixture products (which are easily available in the market at affordable rate) is of paramount importance and their supply from external sources is utmost crucial for better animal health and optimum productivity.

FUNCTIONS OF MINERAL ELEMENTS IN ANIMAL SYSTEM:

- The major minerals provide structural and electrolytic support while the trace elements influence reproduction system, appetite, immune competency.
- Minerals governs resistance of animals to various diseases such as alimentary osteodystrophy, pasture tetanus, rachitis, osteoporosis, osteoarthritis, anemia, parakeratosis, retarded growth, reproductive failure and reduction in immunity.
- Minerals are vital for proper growth and development of animal system. There sufficiency and balanced supply is vital for proper functioning of digestive system, respiratory system, reproductive system in the animals as a component of enzymes and hormones.
- Minerals are essential constituents of skeletal structures such as bones and teeth.
- Minerals play a key role in the maintenance of osmotic pressure, and thus regulate the exchange of water and solutes within the animal body.
- Minerals serve as structural constituents of soft tissues.
- Minerals are essential for the transmission of nerve impulses and muscle contraction.
- Minerals play a vital role in the acid-base equilibrium

of the body, and thus regulate the pH of the blood and other body fluids.

- Minerals serve as essential components of many enzymes, vitamins, hormones, and respiratory pigments, or as cofactors in metabolism, catalysts and enzyme activators

BENEFITS OF FEEDING MINERAL MIXTURES:

- Improves growth rate of calves, hence early puberty
- Improves reproduction efficiency in male and female animals
- Reduce inter-calving period leading to more productive life of animals
- Improves efficiency of feed utilization
- Improves milk production and SNF content of the milk
- Better immune response; hence better resistance against diseases

FEEDING RECOMMENDATION

Mineral mixture can be fed by mixing it with concentrate mixture or by mixing 15-20 gm common salt to it. Usually, compound cattle feed contains mineral mixture at varying levels; however, additional requirement can be met by mixing it with feed. General recommendation for feeding dose of mineral mixture is as following:

S.N	Category of animals	Recommended dose
1	Calves	20-25 g per animal daily
2	Heifers and dry animals	50 g per animal daily
3	Milking Animals	100-200 g per animal daily

AREA SPECIFIC MINERAL MIXTURES:

Mineral mixture ingredients and composition may not be uniform for all the regions. They depend upon various factors such as quality and nutritional composition of fodder and feed materials available in the region hence; it varies from state to state. For the preparation of mineral mixture for the state of Uttar Pradesh, Madhya Pradesh and Rajasthan, following ingredients and specifications are recommended:

S.N.	Ingredients/characteristics	Requirement
1	Moisture (%), Max.	5.0
2	Calcium (%), Min.	27.5
3	Phosphorus (%), Min.	9.0
4	Copper (%), Min.	0.2
5	Zinc (%), Min.	1.2
6	Manganese (%), Min	0.3
7	Cobalt (%), Min.	0.01
8	Iodine (%), Min.	0.02
9	Fluorine (%), Max.	0.05
10	Acid insoluble ash (%), Max.	3.0
11	Lead (ppm), Max.	20.0
12	Arsenic (ppm), Max.	7.0

CONCLUSION:

Minerals are vital components of animal nutrition which required by dairy animals for their metabolic functions, growth and development, higher milk production, reproduction and health. Animal cannot synthesize minerals inside its body and usually feeds and fodders fed to the dairy animals do not provide all the minerals in the required quantity. Therefore, animals should be provided with adequate and balanced amount of good quality minerals in their ration. Supplementation of bio-available minerals through mineral mixture is of paramount importance and their supply from external sources is utmost crucial for better animal health and optimum productivity.



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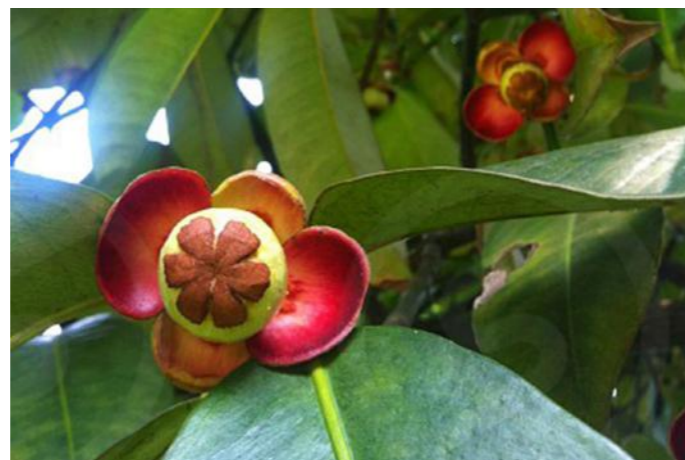
THE QUEEN OF FRUITS

MANGOSTEEN

Harmanjot Kaur¹, Antul Kumar² and Anuj Choudhary³

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Fruits and medicinal plants – Two terms of different thoughts. It's the time when plant magic enlightened the world. One such fruit, known as Mangosteen, having reliable health benefits and used as medicinal plant too.

Mangosteen is a unique Indonesian fruit having sweet-sour and pleasant taste, enriched with beneficial compounds like xanthones. Mangosteen has been used as an important component in health supplement products for promoting health and also in weight loss. It is primarily used in various folk medicines for treatment of diseases like diarrhea, wound, fever and many more. Due to its wide pharmacological properties, it is considered as valuable fruit as well as medicinal plant.

INTRODUCTION:

Mangosteen is a tropical fruit, belonging to family Clusiaceae and widely cultivated throughout South-East Asia including Thailand, Malaysia, Sri Lanka and Singapore. Recently, Indonesia is an emerged country in cultivation and exporting this fruit. Mangosteen is a slow growing tree, whose height lies in between 6-25 mt. Flowers are red or green coloured whereas, fruit is dark purplish in colour, having white fleshy pulp that is segmented with seeds. Botanically Mangosteen is

known as *Garcinia mangostana*, but vernacular names vary in different languages as called Mangustanin Hindi, Kokam in Marathi, Kaattampi in Malayalam, Hannu in Kannada and Kao in Bengali language. Fruit of mangosteen enriched with several xanthones which shows antioxidant, anti-tumoral, anti-allergic properties. Mangosteen's peel has been used traditionally for treating skin infections, urinary tract infection and also considered as laxative, anti-fever agent. Seeds of mangosteen used during treatment of diarrhea, dysentery, ulcers and wound infection.

HISTORICAL BACKGROUND:

The readily available sugar in fruits promotes them ideal candidate for hypoglycemic patients. Thailand and Burma were first countries which start domestication of mangosteen trees. In India, it was firstly introduced in 1881. Once, the Queen Victoria from Britain told about a divinely delicious purple fruit, which grown

in the region of Southeast Asia. The Queen made a promise to bestow knighthood on anyone who would bring it to her, but all efforts failed. The major reason behind it was that, in the 19th century, the journey from Southeast Asia took months. During transportation, this delicate fruit get deteriorate before reaching Britain. Durian and mangosteen shares the same fruiting season. While the 'King of fruits' is considered by the Chinese to be 'heaty' due to its rich and heavy flavor, the mangosteen possesses just the opposite, 'cooling' properties, and has the most exquisite juicy snow-white flesh - sweet yet slightly acid. These are the main reasons that mangosteen is honoured as the 'Queen among all the fruits'.

CULTIVATION STRATEGIES:

Mangosteen grows well in temperature upto 36°C and at 90 % humidity conditions and preferred humid tropical environment. An annual rainfall of at least 200 cm and an altitude of 1500 m necessary for good growth. Well drained, deep clay loam, rich in organic matter, 5.5 to 6.5 pH is ideal for cultivation of this plant. Plant is shade loving, in which fruits and leaves are highly susceptible to high temperature. The seeds of mangosteen is an asexual propagule and propagation can be done through method of grafting, but trees develop from seeds are more vigorous and high yielding.

Nutrients percentage		Health Benefits	
Folates	8%	1.	Anti-cancerous
Niacin	2%	2.	Anti-inflammatory
Pyridoxine	3%	3.	Anti-oxidant
Riboflavin	4%	4.	Skin care
Thiamin	4.5%	5.	Immunity booster
Vitamin A	1%	6.	Fasten healing
Vitamin C	12%	7.	Cures diarrhoea
Sodium	0.5%	8.	Tackles menstrual problems
Potassium	1%	9.	Weight loss
Calcium	0.5%	10.	Safeguards heart health
Copper	7%		
Iron	2%		
Magnesium	3.5%		
Manganese	4%		
Phosphorus	1%		

NOTABLE APPROACHES IN HUMAN HEALTH:

A. Antioxidants Source:

This plant is a rich source of antioxidants as well as vitamins. Major antioxidants which are found abundantly of naturally occurring polyphenol compounds such as Xanthones. Mangosteen fruit consists of has two classes of Xanthones –alpha mangosteen and gamma mangosteen. There are about 20 known Xanthones are found, majority of which are found in the wall of fruit wall (pericarp) of the fruit. Xanthones play key role in reducing oxidative stress which is caused by free radicals. The antioxidants present in fruits protect the body from various diseases like common cold or flu by damaging the free radicals. This also decrease the risk of cancer as well as heart disorders.

B. Immunity Booster:

Mangosteen enriched with vitamin C also, which improve immune system by coupling with Xanthones. On one side Xanthones help in fighting with the free radicals whereas Vitamin C help in promoting immunity, by increasing production of white blood cells (leucocytes).

C. Maintain blood pressure and improves heart health:

Mangosteen enriched with potassium, magnesium,

copper, and manganese containing in mangosteen can help regulating blood pressure of body. Potassium especially weeds out the negative effect infused by excess intake of salt (sodium). It also promotes heart health by maintaining normal heart rate and keeping risk of coronary attacks at bay. Mangosteen not only lowers the cholesterol levels in the body but also reducing the blood pressure and the other consequent heart ailments.

D. Anti-Inflammatory:

Due to compounds, it possesses property of anti-inflammation and help in reducing swelling. The inhibited release of Histamine and Prostaglandin helps in the anti-inflammation process. Inflammation can cause cold, flu, and increase pain in swellings.

E. Prevention of skin disorders:

Due to high antibacterial as well as antimicrobial properties, and the important compound Xanthone can lower down the risk of many skin diseases to a great extent by repairing the damaged cells. Due to presence of vitamin C, skin health improves. Traditionally, there is usage of mangosteen for treatment of acne. Its ability of scavenging free radicals coupled with the suppression of production of Cytokines, which is major cause of acne problems and can prevent skin from developing acne.

F. Weight Loss:

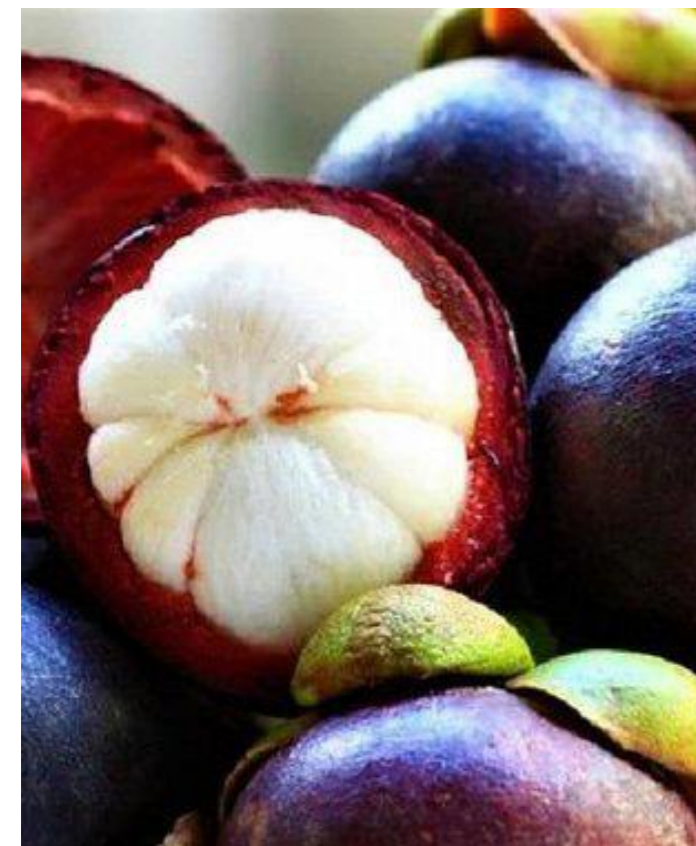
The fruit of mangosteen can also help in reducing weight and maintain body figure. Mangosteen's fruit contain less (63 calories per 100 gram) and saturated fat is almost zero. It is almost free from cholesterol. Mangosteen fruit is enriched with dietary fibre.

G. Anti-Cancer:

Mangosteen have found that it's loaded with xanthenes, which are bioactive compounds offering numerous beneficial antioxidant properties. Mangosteen extracts had in vitro and in vivo anti-colon cancer effects while other tests on human cells demonstrated mangosteen's cancer-fighting properties against prostate cancer and skin cancer.

CONCLUSION:

During recent years, mangosteen becomes popular dietary supplement, due to its health promoting properties. Farmers can commercially cultivate it and get premium price in market. Mangosteen is rich source of antioxidants that reduce the ageing effect and make skin healthy. The signs of ageing are also brought about by oxidative stress caused by free radicals, which is battled efficiently by the antioxidants of mangosteen. The antioxidant Catechin especially works wonders for your skin by preventing wrinkles and signs of ageing. Hence it is "QUEEN OF FRUITS". Farmers can commercially cultivate it and can get premium prices in the market for this superfood.



Agriculture Minister (HIMACHAL PRADESH) Sh.VIRENDER KANWAR, BJP General Secretary Sh. TRILOK G and BJP Kisan Morcha President Sh. Rakesh Sharma, Mukesh Narwal Ji with the MD Arun Malik of Digital Kisan Farming and Organic Producer Company Pvt. Limited

MBA AS AN OPTION

AGRICULTURE STUDENT'S PERSPECTIVE

Kartik Rana

UIAS, Chandigarh University, (Mohali) Punjab

INTRODUCTION

As a student pursuing my B.Sc. in Agriculture and being a final year student, I had to look for the options I have after this degree. After some research, I found out that I can do my Masters in business (MBA Agri business or normal MBA). Out of these two, MBA (ABM) is a more suitable course for the agriculture students as it is specialised for the students pursuing Agriculture. I found this interesting as not many students in my class, when asked took this as an option for pursuing their Masters.

MBA (AGRI BUSINESS)

Agri-business explores the production, marketing and trading of products related to agriculture. The MBA programme also covers improved growing techniques, agricultural machinery, fertiliser, pesticides pre and post harvest handling, storage, transportation, packaging and labelling. Critical management issues as financing and technical assistance, preparation of products for exports, overseas marketing issues and government policy are also an integral part of the programme. Some of the optional courses offered in an Agri-Business Management Programme are Agricultural Finance/Banking, Agro Processing, International Agriculture and Trade Policy, Logistics and Infrastructure Management in Agriculture, Marketing of Agricultural Inputs, and Management of Technology for Sustainable Agriculture, Rural Advertising etc.

Why Agribusiness Management is Important?

Agribusiness is not just a means to earn and feed people. There is a lot of science that goes behind growing the crops best way possible so that the results are favouring. Its importance is often overlooked. Here are some of the essential things that it takes care of:

- Assembling the seeds, fermenting them, sourcing raw food products and supplying them so that the waste is minimal; this all is covered under Agribusiness.
- Equipment makers, chemical manufacturing, logistics providers, and so forth.
- Without a proper infrastructure, the whole system can crumble and people will be devoid of the main necessity: FOOD.

Eligibility criteria for Agribusiness Management

The criteria vary from college to college but you should maintain a minimum of 50% aggregate in graduation.

- A valid scorecard from CAT/MAT and other exams will be a prerequisite for that.
- Graduation with agriculture or allied farming as the main subject.
- Candidates waiting for their final year graduation results are welcome too.

Skills required for an MBA in Agribusiness

- A keen interest in the field of agriculture
- A highly practical business sense
- Should have no hassles dealing with farmers, visiting rural areas.



TOP 5 BENEFITS OF MBA IN AGRIBUSINESS

After getting MBA degree in Agribusiness:

- 1.You will become a huge contributor to eliminating poverty from India.
- 2.You can choose between public and private sector jobs.
- 3.You can pursue PhD after your postgraduate degree.
- 4.You will understand the types of soil and understand their composition.
- 5.You can become an entrepreneur helping farmers and other companies with your consultancy & expertise.

MBA Agriculture Colleges

- Govind Ballabh Pant University of Agriculture and Technology, Pantnagar
- Swami Keshwanand Rajasthan Agricultural University, Bikaner
- Dr YS Parmar University of Horticulture and Forestry, Nauni, Solan (HP)
- IIM, Ahmedabad
- IIM, Lucknow
- BHU, Varanasi
- Symbiosis, Pune
- IABM, Bikaner
- NIAM, Jaipur

MBA Agriculture Syllabus

Though the courses and curriculum vary slightly from university to university, the core topics and areas are consistent. Syllabus of MBA Agriculture as prescribed by various Universities and Colleges:

Sr. No.	Subjects of Study
1	Agricultural Markets
2	Agricultural Pricing
3	Agricultural Law
4	Futures Trading
5	Agricultural Economics
6	Farm Management

EXAMS RELATED TO MBA

CAT, XAT, SNAP, CMAT and TISS

CAT (Common Admission Test): MBA Entrance exam is often considered as the mother of MBA entrance exams. It is conducted by one of the 20 IIMs on rolling basis. This year IIM-Kozhikode has been entrusted the responsibility of conducting the exam. CAT Exam is generally conducted in the month of November every year with each year more than 2.4 lakhs students appearing for one of the toughest MBA entrance exams of India. The score of CAT exam is not just accepted by IIMs, but also by other top non-IIMs such as FMS (Delhi), MDI (Gurgaon), IMI (Delhi), IITs (pan India) among other popular institutes.

Eligibility Criteria: Candidates possessing graduate degree with minimum 50 percent or equivalent CGPA score can appear for CAT.

Exam Pattern: CAT Exam comprises of 3 sections, namely Verbal Ability & Reading Comprehension, Data Interpretation & Logical Reasoning and Quantitative Ability. A total of 100 questions are asked in the exam. For each correct answer +3 marks are awarded, for each incorrect answer -1 is deducted. No mark is deducted for un-attempted questions.

CONCLUSION

A common thing that every student who is pursuing or has completed their BSc in agriculture should know is that there is very less scope for the people in this sector just with a bachelor's degree. Students need to complete their Masters in order to get a decent job. So, this MBA is a really great alternative for the students who want to do something other than the traditional Master's degree. This has high scope as well higher chances of getting a high paid job as compared to the other options available.

GROWING DEMAND FOR ODD SHAPED WATERMELONS



Linu C

Department of Plant Physiology, College of Horticulture, Kerala Agricultural University, Vellanikkara, Thrissur

Watermelon (*Citrullus lanatus*) is an annual plant belongs to the family Cucurbitaceae. Climate suitable for watermelon cultivation ranges from tropical to temperate with pH between 5.5 and 7. It is the best fruit for consumers during summer seasons because it contains 91% water and 6% sugars. The presence of high amount of water helps to reduce thirst and prevent dehydration. It also contains vitamins A, C, B6 and potassium. Watermelon is highly recommended for liver patients as it provides cooling effect on the liver. The fruit type is pepo, which has thick rind (exocarp) and fleshy center (mesocarp and endocarp). The general shape of watermelon are oval or round. But, recently square, cube, heart and pyramidal shaped watermelons are trending in the market.

Reasons for the production of odd shaped watermelons

Huge size of watermelon cause many problems including consumption of huge place, difficulty in accommodation in to a refrigerator and need of extra packaging. Also due to round shape it move around while cutting in to pieces. So farmers of Japan decided to change the shape in to convenient forms such as square, cube, heart, pyramidal etc. They took many years for the successful production of differently shaped fruits. This helped easy transportation and handling. Shop keepers are willing to sell this fruit because they are easier to stack and cost effective to ship. Due to its easy handling exportation also increased and consumers started buying odd shaped watermelons. The odd shaped watermelon came up as solution to buyer's who feel difficulty to fit ordinary watermelon in their fridge.

How to produce odd shaped watermelons

Production of odd shaped watermelon is a simple process and every one can easily produce it. It is not produced through genetic modification or cross breeding. Farmers keep baby watermelon inside the acrylic boxes or mold of particular shape and melon adapt that shape while growing. Screw the mold tightly. In order to reach uniform sunlight on the melon transparent mold or glasses are used. Regular inspection, watering and pest control should be done. watermelon fill the mold and become the mold's shape at the time of harvest. The harvesting of melon should be done at proper time to prevent wastage. So far cube, heart, square, pyramidal shaped fruits are available in the market. Among this, square shaped watermelons are easy to produce and popular compared to the other shapes. Square shaped watermelons are preferred by the consumers for its easy handling, cutting and storage in the refrigerator. It also reduced the space requirement.



Market value

The proverb 'rarity brings high prices' has proven universally true in the case of odd shaped watermelons. Now a days, they are conquering the markets over normal watermelons. Consumers are attracted to the melons for their uniqueness. The tourists are also attracted to this fruit and become popular outside the country. This opened an export market in Japan. Odd shaped watermelons are used for gifting purpose. Because it is suitable for packaging and attractive too. Japanese consider gifting watermelon as a luxury items during festivals and functions. They claim that it has good sent and texture.

Market value of this watermelons increasing day by day. Square shaped watermelons have high demand and price compared to normal watermelons. The price is 3-4 times higher than the oval shaped melons. High demand in the market encouraged the farmers of Japan to grow odd shaped watermelons. This paved a way for the increase in export market and currently those melons are exporting to different countries such as Russia, Thailand etc. Not only water melons

but also different odd shaped fruits are available in the market. Japanese square watermelon consider as a luxurious fruit in Russia. Farm lands of Germany started cultivating this watermelon. Due to its high price people of Japan prefer this fruit to show love and care.

Watermelon is a non-climacteric fruit. It doesn't ripe after the harvest. Odd shaped watermelons may harvest before the maturity, which cause a reduction in the sweetness compared to normal watermelons. Some people buy differently shaped watermelons only for gifting purpose because of its taste difference.

Conclusion

Production of odd shaped watermelons are grabbing the attention of world's market. High price and demand attracted the farmers to grow those fruits. Farmers of Japan growing odd shaped watermelons over 30 years. Now world market focussing on this melon and increased export.

STEVIA A NATURAL SWEETENER: MEDICINAL AND ETHNOMEDICINAL EFFECT

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INTRODUCTION

Stevia rebaudiana (Bert.) is a herbaceous perennial plant, commonly known in Sanskrit as “madhu patra,” meaning sweet leaf is a natural and healthy alternative to sugar and artificial sweeteners belonging to the family Asteraceae. The crop is native to Paraguay and by mid 1970s, standardised extract and pure stevioside was utilized commercially in Japan for sweetening and flavouring foods and beverage as a replacement for many synthetic sweeteners. Leaves of this plant contain zero-calorie ent-kaurene diterpene glycosides, a non-nutritive, high-potency sweetener, and alternative to sucrose, being 300 times sweeter than sucrose. It is recommended for diabetes besides extensively tested on animals and has been used by humans with no side effects. It is extensively grown in the subtropical regions, and has been available since decades for its wide use as a sweetener in beverages and to mask the bitter taste of certain herbal medicinal plants in several countries like Brazil, Japan, and Paraguay. It has also been reported that stevia as the first natural non-calorie sweetener used in medicinal green teas for the treatment of heartburn and other ailments, rebaudiana, even though there are more than 200 species of the genus *Stevia*, only *S. rebaudiana* offers the sweetest essence.

Today, in countries like China, Korea, Thailand, Brazil it is widely cultivated. In addition to its sweetness, stevioside has many therapeutic benefits together with associated compounds including rebaudioside A and steviol, including antihypertensive, antidiabetic, anti-inflammatory, anti-tumor, antioxidant, and immunomodulatory behaviour.



MEDICINAL AND ETHNOMEDICINAL APPLICATIONS

Due to its various mode of behaviour such as, sweetener, hypoglycemic, hypotensive (lowers blood pressure), cardiogenic (tones, balances and strengthens the heart), antimicrobial activities, stevia is used in many industries. Different research and documents proved that stevia has its own and natural constituents which are very much beneficial for human health. The primary use of stevia is sweetener, among different applications. Some ethnological uses have been recorded which are enlisted in the table

Country	Ethnomedicinal uses
Brazil	Usually used for cavities, depression, diabetes, fatigue, heart support, hypertension, hyperglycemia, infections, obesity, sweet cravings, tonic, urinary insufficiency, wounds
Paraguay	Diabetes
South America	diabetes, hypertension, infections, obesity
United States	candida, diabetes, hypertension, hyperglycemia, infections, and as a vasodilator

ANTI-HYPERGLYCEMIC EFFECT

Stevia has a revitalizing effect on the beta cells of pancreas, also increases insulin sensitivity and encourages additional insulin production. Many research showed that stevioside was able to control blood glucose levels by improving not only insulin secretion but also insulin utilization in insulin deficit rats. Stevioside lowers the levels of postprandial blood glucose.

ANTI HYPERTENSIVE EFFECT

Physiological and Pharmacological studies have indicated that stevioside from the leaves of stevia act as a traditional systemic vasodilator. Studies have shown that *Stevia rebaudiana* leaf stevioside in both mild and hypertensive rats causes hypotension, diuresis and natriuresis. Stevioside 750-1500 mg / day was indicated to decrease systolic blood pressure by 10-11 mmHg and diastolic blood pressure by 6-14 mmHg within one week of initiation of treatment.

ANTI- OXIDANT EFFECT

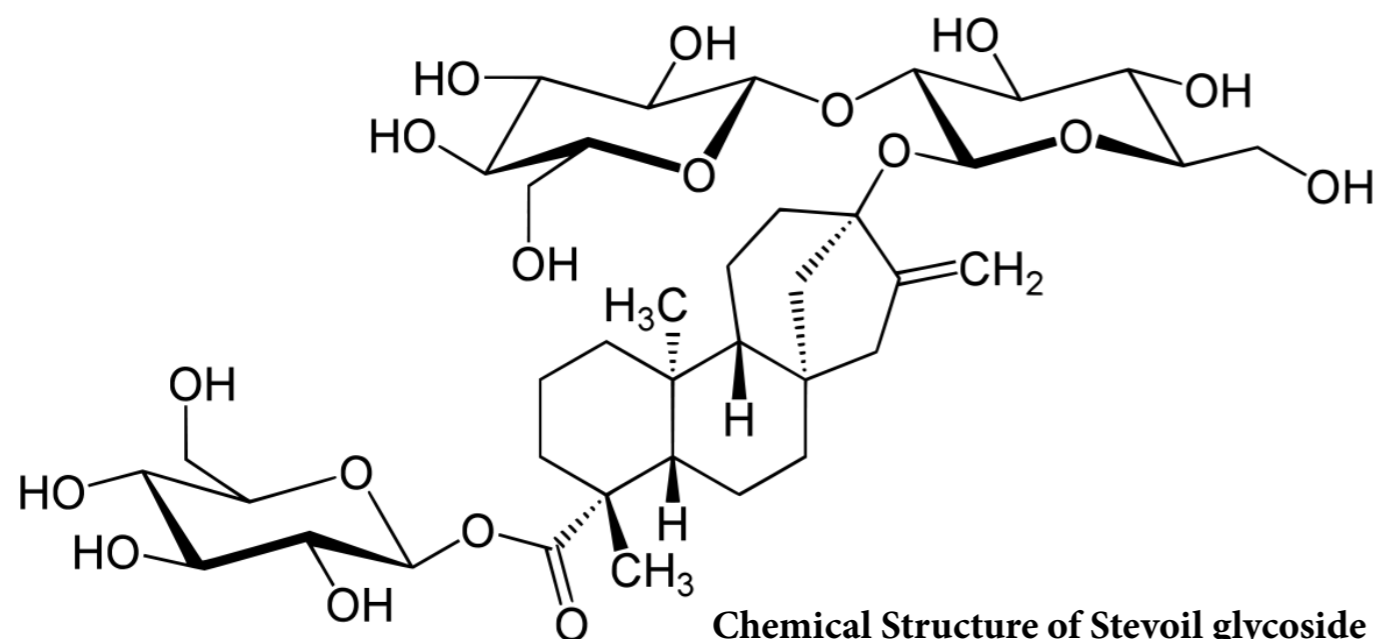
Varieties of antioxidants were obtained from the extracts of *Stevia rebaudiana*, they include, opigenin, kaempferol and quereitrin that inhibited DNA strand damage. It could be beneficial in a variety of diseases like cancer, reproductive problems and developmental defects.

HYPOGLYCAEMIC ACTION

The existence of the steviosides themselves is possibly what has made stevia productive for hypoglycemic action. Hypoglycemia is known as low blood sugar is when drops to below average and symptoms include clumsiness, trouble communicating, and confusion, loss of consciousness, seizures, or death. Stevia is thought to be effective for diabetes and hypoglycemia because it nourishes the pancreas and thus helps to restore normal pancreatic function.

CONCLUSION

For its medicinal values and stimulating actions, stevia is now being used worldwide. Life styles of present days alarmingly increase the incidence of diabetes, hypertension and obesity especially affecting the young adults. These are to be addressed properly or a serious consequence is inevitable. Among various chemical constituents of stevia, stevioside has a potential mode of actions in controlling type 2 diabetes. It has also drawn all the attention of individuals so that it can be used safely. The huge demand prompts biotechnology companies to develop stevia on a commercial scale through tissue culture and to sell stevia in various forms, such as leaf powder, liquid and fresh leaves.



Chemical Structure of Steviol glycoside

ANTIMICROBIAL EFFECT

The ability of Stevia to inhibit bacteria and other infectious organisms' growth and reproduction is significant in at least two respects. First, it can help to examine a lower incidence of colds and flues in enhanced products, and second, it has facilitated the invention of a variety of products for mouthwash and toothpaste

ADVERSE EFFECTS

* Stevia is considered to be safe, with minimal side effects that include; nausea, abdominal fullness, myalgia, muscle weakness, dizziness, asthenia and allergy and also used with caution in diabetes as it is known to reduce the blood sugar levels.

* In hypertensive patients it is used with caution as it is likely to reduce the blood pressure.

* With lack of evidence for its effect on pregnancy and lactation. Stevia is not recommended during pregnancy and lactation.

जय जवान

जय किसान

जय विज्ञान



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आत्म निर्भर - किसान

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2022 तक किसानों की आय
दोगुना करने का लक्ष्य

एक मण्डी - एक भारत

FPO Digital Kissan Farming &
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IMPACT OF CORONA VIRUS ON FISHERIES , AQUAPONICS ENSURE THE STEADY FOOD SUPPLY

SHRUTI GABA

CT Group Of Institution, Shahpur, Jalandhar

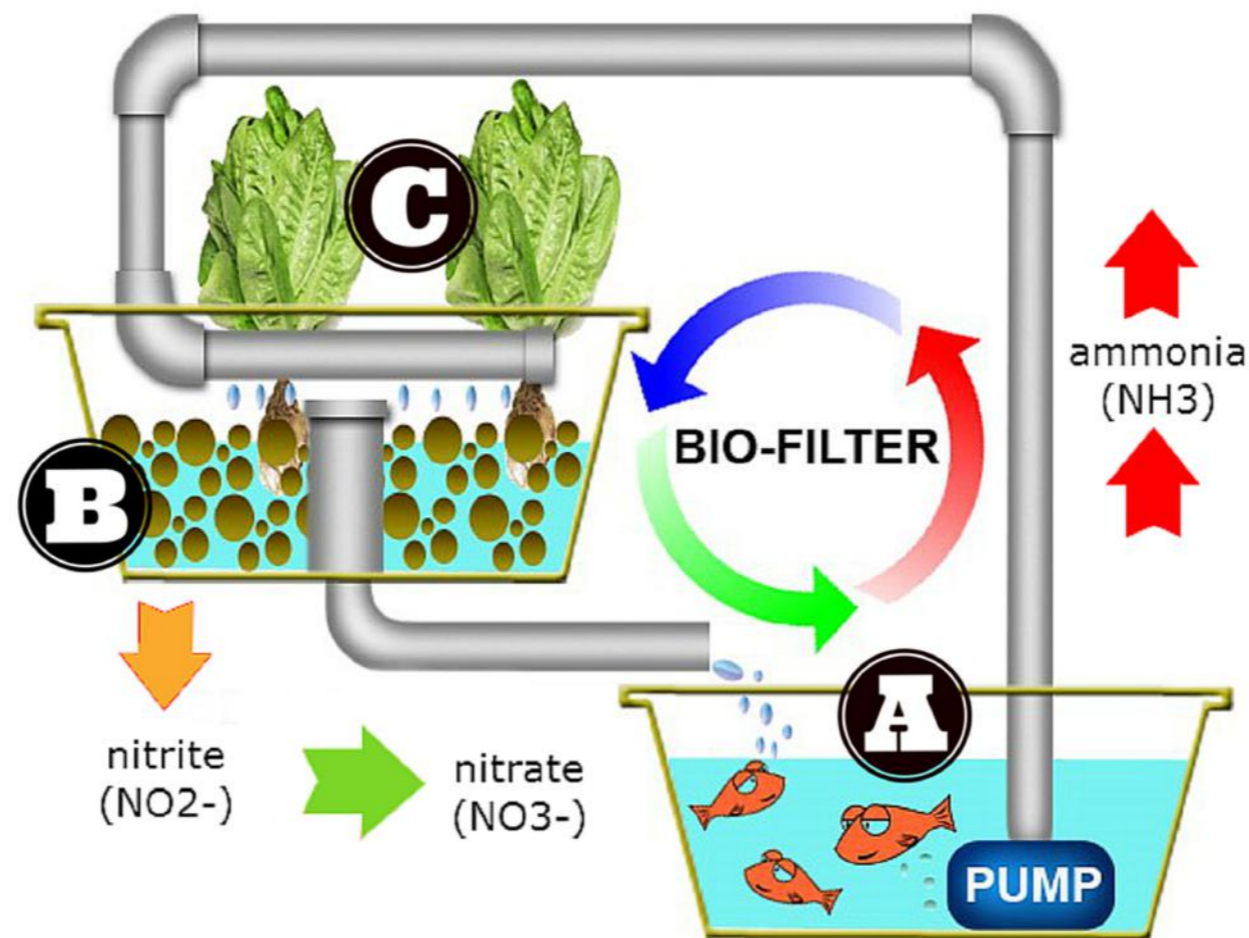
The Corona virus outbreak is already disrupting international travel and trade. The pandemic could impact the global food supply chain and leave some populations without adequate nutrition. This pandemic shows that we need to invest in local agriculture to boost our supply of local, reliable food. Aquaponics, hydroponics, and controlled-environment agriculture can produce large amounts of food with minimal space and resources. These water-based growing methods do not require soil and can be practiced from arid deserts to urban rooftops.

INTRODUCTION

Indian Fisheries in the pre-COVID-19 period:

The COVID-19 shock is playing out in almost a similar manner in all around the world by squeezing out demand and supply and the consequent economic slowdown. In India, the problem might be long-lasting because before the pre-COVID-19 period Indian economy had deteriorated significantly after years of infirm performance. In 2018-19 India's fish production was 13.34 million metric tones which was about 6percent greater than the previous year. As per seafood export is concern, it is the fourth biggest exporter in the world (Seafood Source). In 2018 India exported 13,77,244 tones seafood which etched \$ 7.08 billion (The Economic Times, 2018). In 2017-18 Andhra Pradesh was the leading fish producing state in the country, followed by West Bengal and Gujarat by producing 34.5, 17.42 and 8.35 lakh tones fish respectively. In inland production, Andhra Pradesh stood first followed by West Bengal and Uttar Pradesh. Gujarat was the first state in marine production in the country). Some major landed marine fish were hilsa, Indian oil sardine, sea catfish, lizard fish, seer fish, barracudas, silver bellies, anchovies, clupeids, mackerels, skipjack tuna, yellow fin tuna, crust crab, penaeid and non-penaeid prawn. In inland fish production, Indian major carps were the most cultured species followed by exotic carps, catfishes, minor carps and murels.

As per percentage share of disposition of catch is concern, 78percent was used as fresh marketing, followed by 8percent as freezing and 4percent as curring. India produced 52,262 million fry in 2017-18 in which West Bengal was the major contributor.



IMPACT:

Fishes are one of the major nutritious part of the global food chain and key source of employability generation among rural coastal people. Fish and fish products are one of the most traded food products throughout the world involving 38 percent international trade. Decreased consumer demand, lower supplies, and interference in supply chains will directly affect the people engaged with the industry such as fisherman, fish processor, fish vendors, suppliers and transport workers. Postponement of various research and development programme, science and management meetings will detain the growth of this sector. Lockdown in the landing centre's and harbors has severely affected the fisher folks in all nine coastal states and four coastal union territories of the country. Starting March 24, 2020 fishers have not ventured into the sea; in the meanwhile, fishing ban season started from July 15 and will continue till June 15, in east coast. For the west coast it is from June 1 to July 31. As a result marine fisherman will not be able to fish for about 75 days in east coast and 130 days in west coast. So, there is no doubt how this pandemic is going to devastate the fishing industry even after the lockdown. Rural

agricultural labour wages growth was depressed both in nominal and real terms from the pre COVID-19 period. In this circumstance, the corona outbreak will disrupt the fishery activity and supply through several dimensions, like crop harvesting, processing, procurement and marketing. Transportation hurdles, labour movement restriction, will directly affect the farming and processing industry. March to June is the peak season for fish farming as well as shrimp farming which will get hampered for non-availability of migrant workers. Shortage of fish seed, fertilizer and other inputs may also hamper the desire production level. Suppliers and producer will be greatly affected by reduced demand, transport constraint and closure of different restaurants and retail outlets. Lack of proper functioning of supply chains, lots of farmers are not able to sell their crop properly, leading to massive losses. Despite being essential service, fish and food supply chains are facing a lot of difficulties in marketing. Some people are not buying the fishes in afraid

CONCLUSION

COVID-19 outbreak has been deemed a global health emergency, and its impact on developing countries like India is one of heightening concern. With 1.3 billion populations and the precarious situation of the economy in the pre-COVID period, prolonged lockdown would be ruinous for the economy. Especially agriculture and the allied sector will be in a most vulnerable condition. India, with its apt governance, took the situation as a challenge and doing in all way of possibilities to combat with the pandemic. At the same time, the government and policymakers need to be prepared to minimize the impact of the shock and V-shaped recovery of the economy in the post COVID period.



OCTOBER MONTH FARMING OPERATIONS

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INTRODUCTION

Every month in a year has its own essence and importance in Agriculture. October is no way different from this. Since October is the beginning of the Autumn season, therefore farmers have lot of work to carry out in these days. Like any other months of the year, farming operations must go on to serve the feeding necessities of the World. Farming operation means the activities associated with a farm viz, growing and harvesting of crops, animal husbandry and fishing. Farming activities don't include the processing or distribution of crops or fowl. In the month of October, monsoon rains are almost over. Therefore, soil is filled with enough moisture. Farmers take advantage of that moisture and grow a variety of crops with or without irrigation. The cool nights and warm days of October are good for seed germination. Spring crops and flowers start appear so, October is the time to plant more to ensure a continuous supply of delicious vegetables, juicy fruit and fragrant floral that will last the summer months. Some farming operations carried out in October month are cited below:

CULTIVATION PRACTICES:

Rabi Maize : Optimum sowing time of Rabi maize is middle of September to middle of October. For cultivation of rabi maize a well drained, sandy loam soil free from any kind of water stagnation should be selected. The field should be ploughed thoroughly for deep and fine tith followed by laddering. Before sowing, seeds should be treated with captan @3g/kg of seed or carbendazim @2g/kg of seed. Generally a seed rate of 22.5 kg/ha is required for the purpose of line sowing. Optimum spacing of 60cm*25 cm is followed and a seeding depth of 3 cm is maintained. Sowing of two bold seeds per hill is useful. During the time of field preparation, organic fertilizers or organic manure application is carried out. Farm Yard Manure @4.5t/ha, along with half of the recommended N, full dose of P₂O₅ and K₂O should be applied in the furrows before sowing. Remaining half of N should be top dressed at 30 days after emergence of seedlings. Top dressing of fertilizers should be done alongside hoeing and earthing up so that the fertilizer can be incorporated into the soil. Trench hoe or wheel hoe is used by farmers for hoeing and earthing up.

- Flat bed planting of Sugarcane in North India commences.
- Land preparation and sowing of lentil starts in low altitude regions.
- Preparation of land and sowing of Ragi, Buckwheat and Oat seeds.
- Land preparation practices for sowing of rabi groundnut.
- Land preparation and sowing of rapeseed & mustard. Application of fertilizers (organic as well as inorganic), pre sowing irrigation, hoeing, weeding, thinning are the October month farm operations for this crop.
- Preparation of land for sowing of sunflower and safflower. Since, sunflower is photo insensitive, therefore, it can be successfully grown as a rabi crop.
- Land preparation for sowing of castor after harvest of paddy or recession of flood water.
- Land preparation, seed treatment, sowing, application of fertilizer and intercropping of linseed in the districts of Orissa.
- Growing of Potato : Land is ploughed to a fine tith for the development of tubers. At the time of final land preparation, FYM or compost @20t/ha is applied and mixed with the soil. Before planting of tubers, farmers apply bleaching powder and phorate each @10kg/ha to soil. Potato can be planted whole or cut. If bigger

sized tubers are used, then it is cut into pieces leaving at least two eyes. The tubers are dipped in vitavax powder for 15 minutes followed by shade drying to check microbial growth. Seed potato kept in cold storage are taken out and spread on the floor of a well ventilated room in dark condition for proper sprouting. Besides, earthing up, fertilizing and application of first irrigation are also carried out in the month of October.

- Preparation of land and sowing of Garden pea, French bean, runner bean, capsicum etc.
- Seed bed preparation for Cauliflower, cabbage, knol khol, broccoli, celery commences.
- Seed bed preparation and sowing of Amaranthus.
- Sowing, Fertilizer application, weeding and intercultural operations in Radish, carrot, beets.
- Land preparation and raising of seedlings for transplanting of onion and garlic.
- Planting of Spinach, lettuce and kale begins.
- Weeding, top dressing and earthing up for winter potato and root crops in high altitude areas completes.
- Earthing up of Brussels sprouts, cabbages to give them support as they become increasingly top heavy. Cutting down of any yellow leaf is also practiced.
- Curing of Pumpkin & Squashes.
- Mulching of Celeriac and parsnips with straw.
- Drying out of beans for storage purpose. When they are dried completely, pudding and storing them in airtight container is carried out.
- Pruning of blackberries and summer raspberries completes.
- Filling of soils in polythene sleeves and planting of tea cutting, seed bed preparation for planting tea seed commences.
- Pruning and plucking of tea completes.
- Cultivation of Oyster mushroom completes. Preparation of compost for Button mushroom cultivation commences.
- Cultivation of fruits like gooseberry, grapevine, strawberry, peach, blackcurrant, white currant etc.
- Planting of ornamental crops like gladiolus, daffodil bulbs, tulip bulbs begins.
- Greenhouses and Cold Frames : In Green houses, a lot of veggies can be grown or readied for planting in spring. For instance, Peas and winter salad vegetables, cauliflower etc. Herbs such as basil, parsley can be sown in October and grown throughout the winter.

HARVESTING PRACTICES:

October month is the harvesting period of so many vegetables and fruits. Examples include : Beetroot, Broccoli, Brussels sprouts, Carrots, Cabbage, Peppers, French bean, Kohl rabi, Leek, Marrows, Pumpkin, Spinach, Summer squash, Sweet potatoes, Turnips, Winter Radish, Winter Squash, Celery, Chicory, Lettuce, Tomato, Grapes, Melons, Pears, Plums, Raspberry etc. Some of them are specifically mentioned in the following ;

- During October, Harvesting of cabbage, knol-khol, radish, chilli, brinjal, tomato, cauliflower commences in high altitude region areas. Also, early planted root crops are harvested in this month.
- Harvesting of lady's finger, cucurbits begins and jute, mesta completes in low altitude regions.
- Harvesting of early transplanted kharif paddy starts in high and medium altitude regions.
- Harvesting of ginger and turmic begins in high and medium altitude regions.
- Harvesting of Apples completes by about the middle of the month.

PRACTICES IN ANIMAL FARMS:

Since, weather changes from the month of October, therefore, arrangements are made by the animal farmers to protect the animals from cold.

- Shearing of sheeps is carried out. 21 days after the sheep have been sheared, their bodies should be drenched with disinfectants to protect against ecto parasites.
- Vaccination of animals against various diseases.
- Deworming is done in the October month.
- Drying off cows. Drying off in batches of 10 is recommended.
- Sowing of improved varieties of fodder must be done to ensure continuous supply of food during the winter months.

PRACTICES IN THE FISH FARMS :

- Selective harvesting of fishes.
- Recording of physical and chemical parameters of pond water.
- Daily recording of behavioral changes of brood fish.
- Maintenance of livestock and repair of equipments.
- Exchanging of water and trial netting practices.
- Harvesting of blue clawed pawn in Haryana.

OTHER FARMING PRACTICES:

- This includes Preparation of Organic manures like Compost, Vermicompost, green manuring; Digging of trenches for winter crops; Hydroponics; Aeroponics etc.
- Clearing out old vegetations.
- Removal of plant supports like bean poles, pea sticks, tomato stacks etc and store them in other places under the farm. Leaving them in the cultivation field itself will cause rotting of the plant supports and in the next year Farmers need to make them again.
- Loosening of any hard or compacted soil and weeding.
- Covering of seed beds with polythene sheets or other mulch materials. This practice conserves moisture, suppresses any weed growth and keeps off worst of the rain.
- Ordering of new fruit trees and bushes from nurseries for planting in the next month.
- October is the ideal time to take soil samples of the farm.

CONCLUSION:

Farming is something that solely depends on nature. (Of course, now-a days techniques are available to grow crops in the off season also. But this will require some time for getting popular in a country like India.) If a farmer knows how to take benefit of nature and natural resources, farming for him will be remunerative. October's crisp autumnal days bring changing colours, shorter days and the occasional frost. While most vegetables don't have enough time to grow before frost sets in, some crops actually prefer the cooler months of October. This month indicates the mid spring, therefore plenty of things have to do in the garden also. So, it can be concluded that October is equally important for the farmers than any other months in a year. It is the month of Harvest, Glory, Ripeness and new sowing.



MARKETMIRCHI.COM

CONNECTING RURAL MARKETS FOR FREE

Compiled by- Mohit Bharadwaj

During the times of COVID-19 pandemic when producers and consumers are finding it difficult to commute and trade, digital technology opens the world of opportunities. Online grocery stores and e-commerce companies are driving sales in urban areas through leverage of digital technologies while ensuring safety. In rural India, where there are more internet users than urban India, it is felt that use of digital platforms should catch pace.

ABOUT MARKETMIRCHI.COM

Ms. Pragati Gokhale in collaboration with Maharashtra Knowledge Corporation Limited (MKCL) came up with this webportal marketmirchi.com to help rural people in marketing their Rural/Agro Products, services directly without middleman. marketmirchi.com have all the rural/agro categories of products and services for rural marketing and that's too for free.

ABOUT MISSION MERAMOBILEMERAMARKETING

Under this webportal Ms. Pragati Gokhale and her team is working on a Unique Project Mission Mera Mobile Mera Marketing. It is disruptive bottom up approach for Rural Marketing in India through which we are enabling rural entrepreneurs/ artisans/self help groups/farmers to do their free Digital Marketing using their own mobiles.

Mission MeraMobileMeraMarketing was launched in 2016 as an initiative to facilitate forward and direct market linkage between various agribusiness companies engaged in procurement and stakeholders like farmers, agripreneurs, artisans, self-help groups, Farmer Producer Organisations (FPOs) and other institutions. The companies procuring through the online platform, 'Marketmirchi.com' now not only include start-ups and medium enterprises but also big players like Big Basket and Reliance Retail.

Mission MeraMobileMeraMarketing via marketmirchi.com is completely free social mission the brainchild of Pragati Gokhale. MKCL has supported it by developing useful videos on how to use marketmirchi.com which are further disseminated to farmers through community radios, Krishi Vidnyan Kendras, NABARD etc. Pragati Ji is Advisor to Rajiv Gandhi Science & Technology Commission, Govt. of Maharashtra and National Resource Person with the Ministry of Rural Development, Govt. of India and can be contacted on 9822719618. She retired as Deputy Director with Mahatma Gandhi Institute for Rural Industrialization, Ministry of MSME, Govt. of India. The Department of Science and Technology, Govt. of India recognized her efforts and made it a part of Post Covid Reforms Policy.



THE KEY COMPONENTS OF MISSION MERAMOBILEMERAMARKETING ARE

1) WWW.MARKETMIRCHI.COM

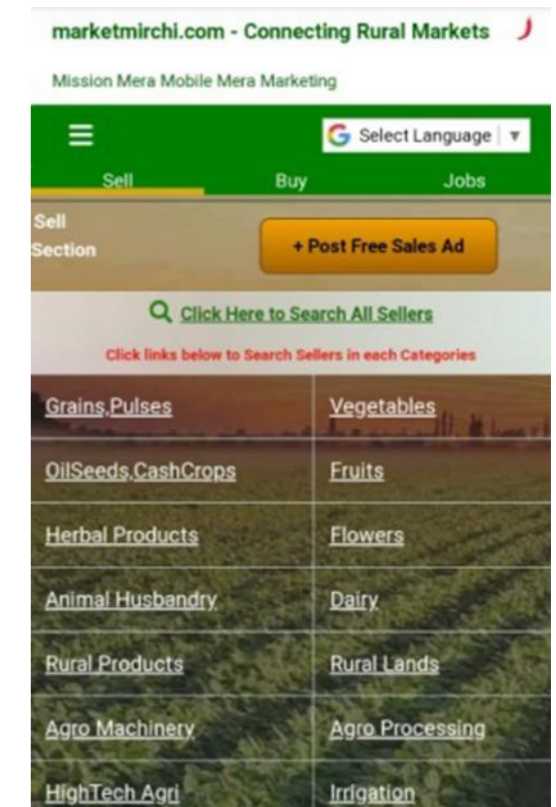
Indigenous, responsive, multilingual web portal www.marketmirchi.com highlighting all rural / agro categories for Free digital marketing of rural Products/Agro Products, rural Services and rural Jobs. Developed in latest progressive web technologies most suitable for rural areas as downloading like App is not required but have all features like App. Moreover it is totally Free Open Model facilitating Buyer Seller deals in Rural Domain, where Rural Sellers/ Buyers can contact each other, establish Market Linkages and go ahead. It is not a Closed Business Model which E-commerce Companies offer.

2) CREATION OF BACK END LINKAGES

Hands on sessions of rural stakeholders viz., farmers, self help groups, artisans, rural entrepreneurs are taken on using this platform effectively for posting their own ads as well as for making direct market linkages. These Capacity Building programs are done for them using their own mobiles. Various online programs are also taken for creating these back end linkages with support from various Govt., Non Govt. players working in Rural Development Sector. MKCL has developed Hindi videos on how to use marketmirchi.com for your zero budget digital rural marketing for the online trainings.

3) CREATION OF FRONT END LINKAGES

Various Online/ Offline strategies including Artificial Intelligence are leveraged to find B2B, B2C linkages for rural products. Now even Big Basket, Reliance Retail have posted their procurement Ads on marketmirchi.com. More than 60 % direct market linkages are generated by this absolutely free but effective humble effort apart from increasing digital foot print of Rural India.





ARC BIO KHAAD

ARC BIO FUEL (P) LTD - THE GREEN PROJECT

A SUCCESSFUL AGRI STARTUP BY SINGLA BROTHER'S

Compiled by : Abhishek Dehal



Sahil Singla an MBA graduate, is the founder of the project. He manages the production aspects of the company. Abhinav Singla, Btech Graduate. He is the cofounder. He manages the digital aspects of the business. The company is also recognised by StartUp India Initiative.

INTRODUCTION

The ever increasing use of chemical fertilizers has greatly deteriorated the soil quality of our soil. The yields are decreasing day by day, while the use of harmful chemical fertilizers and pesticides is increasing. In 2014, two brothers, Sahil & Abhinav started the company Arc Bio Fuel Pvt Ltd with the vision of producing natural farming inputs and green renewable energy. With their R&D, the company has developed a special natural process to convert cow dung, urine & other organic waste into beneficial natural manure which is known by the name of ARC BIO KHAAD. This is done by following a practical approach rather than producing costly bio-fertilizers in labs. This is the main reason that their natural manure is a very successful product for organic farming.

Dr. Baldev Singh Dhillon (Vice Chancellor) & Dr. Jaskaran Singh Mahal (Director Ext. Edu.) Punjab Agri. Uni. Ludhiana visits ARC BIO FUEL - The Green Project



DOING IT THE NATURE'S WAY

If we read the history of Indian agriculture every farmer had a composting pit in their home where they will decompose the cow dung and use it after 1-2 years of decomposition. But in the modern days due to the unavailability of labour that practice has been abandoned. Nowadays, farmers just dump huge quantity of raw dried cow dung in their farms which causes fungus, termites & other diseases in crops and they end up paying huge costs for it. But, Arc Bio Khaad needs to be utilised in very small quantities and it does not cause any disease in the crops.

Arc Bio Khaad focus on improving the soil quality. It increases the Organic Carbon of soil and adds beneficial micro-organisms in soil. These micro-organisms improve the soil structure and also complete the nutrient requirements of the crop by biological processes. So, it is beneficial for all types of crops, fruits & vegetables. Farmers are using Arc Bio Khaad along with the chemical fertilizers. The farmers observe a change in soil quality and increase in yield from the very first crop. Our farmers are automatically encouraged to use more of Arc Bio Khaad and decrease the use of other chemicals. The dose of chemical fertilizers should be decreased slowly with every crop.

Ultimately, the organic carbon levels of soil will rise and they do not further need to use other fertilizers. In fertile soils, there is a very less chance of plant diseases. A fertile soil is also a home for many crop-friendly insects that eat the disease causing pests & worms. At this stage, the inputs costs of farmers will be very low and they can increase their profits without any worries.

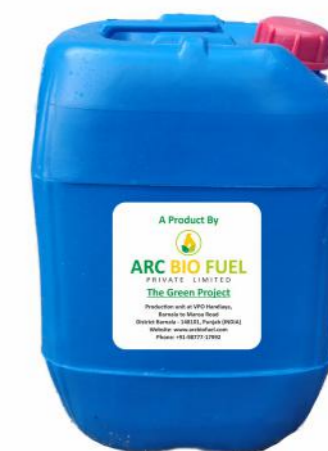


F2F MODEL (FACTORY TO FARM DIRECT DELIVERY MODEL)

Arc Bio Khaad was being supplied to farmers in Punjab, Haryana & Rajasthan since the last few years. But to expand the network, the company has joined hands with several transportation companies to develop a Factory-to-Farm Direct Delivery model for farmers all over the country. Arc Bio Khaad comes in different forms according to the usability of the farmer. Arc Bio Special Dry Khaad comes in powdered form and can be directly sprinkled on the soil after crop sowing. Arc Bio Special Liquid Khaad has been formulated for use in Drip Irrigation System. It can be also directly sprayed on the crop as a growth booster and as an excellent pest repellent.

THE ONLINE FACTORY

The company has a strong digital media presence to reach millions of farmers all over the country. The company updates explanatory & live content on their website social media like Facebook, YouTube, etc for the satisfaction of the farmers. The farmers just need to Google "Arc Bio Fuel - The Green Project" and all the information will be right in front of them. The farmers just need to call at company helpline number easily available on the company website, social media sites, and place their direct order with the company. We encourage small farmers to form groups to place a large order and we shall deliver Arc Bio Khaad direct at their far



VANPROZ V-BIND VIRICIDE: FIRST ORGANIC VIRICIDE PATENTED IN INDIA

Compiled By - Himani Gautam

There are a number of viruses reported to infest our agricultural crops. Viral diseases are responsible for 10-70% crop loss in all cucurbits, papaya and banana. After 4-5 years of hardcore research, we at Vanproz Agrovet LLP developed viricide, which is helpful in curbing viral disease our patent is already published.

VIRAL DISEASE – SILENT KILLER OF ECONOMY

Mosaic viral disease is a silent killer of the Indian economy, because of TMV (tobacco mosaic virus) disease Indian farmers are losing from 10%- 70% of their yield. In case we take export data from APEDA with an assumption of 10% loss in cucumbers, bittergourd, papaya & watermelon, the net loss per annum is close to 21 million tons. We have done successful trials with reputed gherkin exporters & seen positive results in many places. After using our product, we can check this loss due to viral diseases.

WHAT WE DO AT VANPROZ AGROVET LLP

Research & Development
Manufacturing and marketing of Organic fungicides, Biostimulants & Viricides.

SUMMARY OF COMPANY'S TECHNOLOGY

TMV disease is a big threat to gherkins exporters of Karnataka. They are facing 10% loss for last three decades. Loss of 21 million tonnes in yield of vegetables because of TMV viral disease, consideration Apeda export figures 2017 with 10% loss assumption. This loss may vary from 10-70%. Our innovation is viricide which is very effective on tobacco Mosaic Viral Disease (TMV) in gherkins/cucurbits. It's a novel product which is based on phyto-protiens derived from Boerhaavia diffusa, polysaccharides derived from seaweeds, which acts as suppressing & binding agents to the TMV virus and stops its further replication in plants.

OUR PRODUCTS AND THEIR APPLICATIONS:

Products	Applications	Target Crops
V-bind	Viricide	Cucumber, watermelon, Gourds, chilli, banana & Papaya
V-Kure	Fungicide	Vegetables, Paddy & fruits
Vzyme	Biostimulant	Wheat, Fruits & vegetables
Pusp	Flower stimulant	Flowers, Cotton
Immun (Mango Special)	Mango fruit setting	Mango
Ahaar	Micronutrient	Paddy, fruits & Vegetables



V-BIND VIRICIDE

V-Bind Viricide is an organic viricide. We have got its fantastic results on tobacco mosaic virus (TMV), papaya curl virus, cucumber mosaic virus and tomato leaf curl virus. Our Patent (E-1/41054/2017-CHE) is already Published for this product. This product also got Krishi Bhushan Award in 2017.



V-Bind (Viricide) Results in Tomato leaf curl Viral disease
Before Application After Application



V-Bind (Viricide) Results in Papaya Leaf curl disease
Before Application After Application



V-Bind (Viricide) Results in Brinjal leaf curl Viral disease
Before Application After Application



OUR ACHIEVEMENTS

V Bind viricide is appreciated by Principal Scientific Adviser to Government of India & they have put in Agnii.gov.in Website. We have provided solution for TMV disease first time in India. Our product is available online at Amazon & Big Haat, both companies has sponsored our products in Google because of repeated sales. Our products are also available in Pan India through 500 dealers. We have taken IFOAM International organic certification for our products. We received prestigious Krishi Bhushan Award consecutively two years i.e., year 2017 & 2018



Received Krishi Bhushan Award in December 2017 for our innovative products in the presence of Agriculture Minister of MP



ARC BIO KHAAD
ARC BIO FUEL (P) LTD - THE GREEN PROJECT

Arc Bio Special Khaad

(For all types of crops, fruits & vegetables)

A special formulated natural manure for increasing the fertility of soil. Thus, reducing the use of chemical fertilizers.

- It is produced at Arc Bio plant from animal dung with a very special technique.
- The process increases the nutritional value of manure.
- It increases the organic carbon of soil and increases the growth of essential microbes.
- It improves the soil structure, softens the soil & increases the nutritional content of soil.
- The microbes help in completing the nutrient requirements of crop.
- Crop yields increase by 15-20 %.



**Free All India Delivery
(For Large Orders)**

ARC BIO SPECIAL KHAAD
Price- Rs.500 (25 Kg)

**ARC BIO SPECIAL
LIQUID KHAAD**
Price- Rs.750 (20 Ltr)

CALL : 98777-17992 (9am-6pm)
ARC BIO FUEL PRIVATE LIMITED

VPO Handiaya, Dist.
Barnala, Punjab

Find us on

www.arcbiofuel.com