ISSN 2455- 8184

AGRICULTURE WORLD

VOLUME 5 ISSUE 03 MARCH 2019 ₹100

the pulse of global agriculture

China in FOCUS

Agrarian Reforms & Development Models in China p. 24

Glyphosate A slow moving horror p. 48

Supporting Farmers with Quality Crop Protection Products: Challenges & Opportunities p.52

krishijagran @krishijagran 9891405403 www.krishijagran.com

ichiban
CROP SCIENCE LTD.

ICHIBAN ON PATH OF PROGRESS...

Thanks to All Stake Holders, Ichiban Commissions its Second Unit of Manufacturing !

Powered by Japanese Technology

ICHIBAN CROP SCIENCE LTD.

Corp. Off.: 708-713, Best Sky Tower, 7th Floor, F-5, Netaji Subhash Place, Pitampura, Delhi-110034
Tel.: 011-45271800-899

Agriculture Goes Digital

CHANGING FARMERS LIFE

Contributing Towards Doubling Farmers Income

हल ब्राण्ड

Amber Crop Science Pvt. Ltd.

Regd. Office : CSC-GH-4/FF-5, DDA Mkt., Meera Apartments,
Outer Ring Road, Paschim Vihar, New Delhi-110063
Ph. : +91-11-25253078, 69415232
E-mail : ambercrops@gmail.com ● www.ambercrops.com

amber™

the pulse of global agriculture

AGRICULTURE WORLD

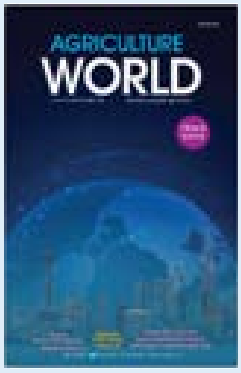
VOLUME 5 ISSUE 03 MARCH 2019 ₹100 PAGES 100

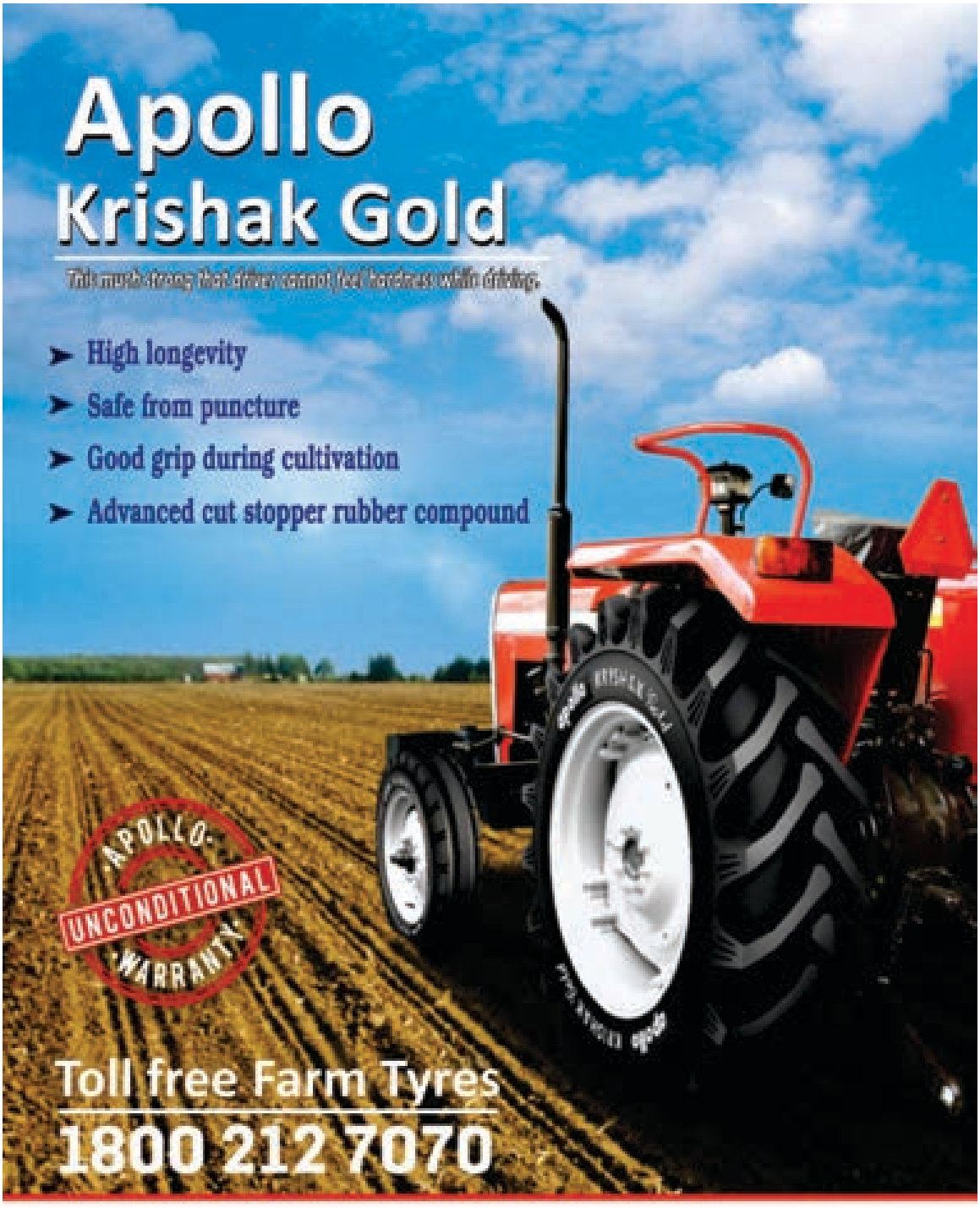
Printed and Published by:
M. C. Dominic
60/9, 3rd Floor, Yusuf Sarai Market, Near Green Park Metro Station, New Delhi 110016.
Tel: 011-26511845, 26517923
Mobile: +91-9313301029, +91-9654193353
Web: www.krishijagran.com

Printed at : Pushpak Press PVT LTD.
Shed No. 203, 204,
DSIDC Complex Indl. Area
Okhla Phase-I
New Delhi- 110020

Agriculture World is published by Krishi Jagran Media Group.
Editor in Chief: MC Dominic

Contents





apollo | MANCHESTER UNITED

GO THE DISTANCE

Editorial

A series of Revolutions have brought in a period of strong growth in our Country. After a steady growth of more than 40 years, the Indian Agriculture Industry at present seems to be grappling with a series of problems. They range from reduction in cultivable land to high cost of crop inputs, counterfeit pesticides, crop losses, fluctuating market prices, lack of marketing networks, well developed value development chains, avenues for value addition of farm produce and digital technology based solutions.

Rethinking new strategies to undergo a series of next generation reforms will likely help us emerge from this challenging situation. The long-term picture looks compelling and stronger and better founded that will show us sustainable solutions to protect our ecosystem. When we talk about Reforms in the agricultural sector, we hope it brings about a series of institutional changes and policy initiatives that will finally give a new push to profit maximization and prosperity in rural areas and especially our farmers. The rural areas are the initial catalysts in rethinking new strategies about the production method, its organization and management.

As we discuss and analyse China in our Issue we see China making decisive steps in reducing rural poverty, increasing agricultural production and advancement in the entire economic system. Agriculture being given the topmost priority in the economic modernization of China, one could witness a new enthusiasm and energy among the peasantry in the rural areas where different local experiments were undertaken in terms of production and marketing decisions. Different provinces in China adopting region specific agrarian development models, free markets getting established where the peasants could go and sell their agricultural produce and the peasant households becoming the self-sufficient economic units.

The Cover Story focuses on the molecule Glyphosate, its safety and implications. The Crop Protection Industry is persistently researching and evolving new products for the farmers. Bio Ag solutions are the latest entrants into the industry and they are very much befitting the needs of the environment, a must for integrated crop management, when it comes to sustainable agriculture.

Concerns over the growing number of counterfeits worth 3200 crores in the market is not only compromising sustainable agriculture but also posing an unacceptable risk to human health. Unless the toxic overload is restricted, India faces the real prospect of a systemic and simultaneous collapse of its healthcare as well as agriculture system in the near future.

Empowering consumer and enforcement authorities with the latest new generation technological authentication seems to be the only way as solutions. Collective Organization is the key to viability of sustainable agriculture as the cases highlighted in a number of factors in China.

Ensuring Sustainability is to create ensuring awareness of the same, awareness in the minds of farmers, consumers, policy makers as well as implementers. Let the concept of sustainability spread around creating less footprints on the world we live and also for the betterment of the coming generations for developing a harmonious society.

MC Dominic
Editor-in-Chief

SOMANI SEEDZ

तेज, सबसे तेज

Seeds of Success

KHUSHI

संकर फूलगोभी खुशी

F1 HYRBID CAULIFLOWER KHUSHI

Under Technical Guidance From 大三種子有限公司
TA SAN SEEDS CO., LTD.
TAIWAN

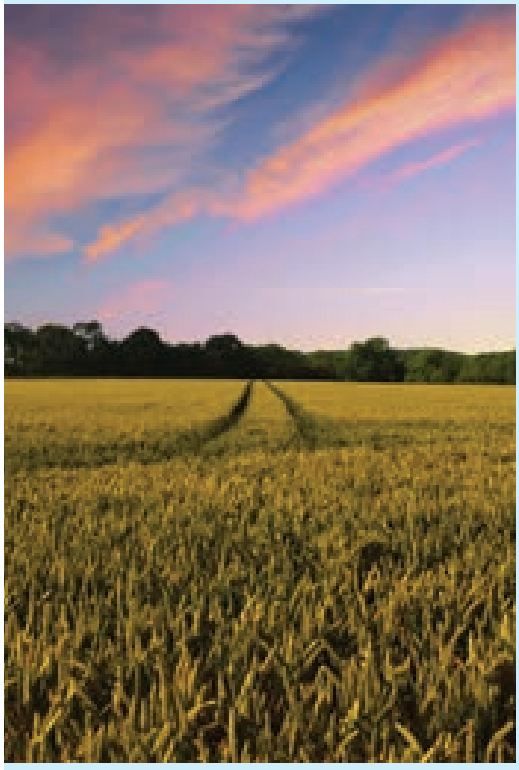
Produced, Packed & Marketed by :

SOMANI KANAK SEEDZ PVT. LTD.

Registered Office: C-91/7, 2nd FLOOR, WAZIRPUR INDL. AREA, DELHI-110052
Processing Plant : PLOT NO.-180, HSIIDC, RAI-131029 (HR.), CUSTOMER CARE NO. : +91 7027072626
website : www.somaniseedz.com ● email : somanikanakseedz@gmail.com

A very small number of crops are dominating globally

Bad news for sustainable agriculture



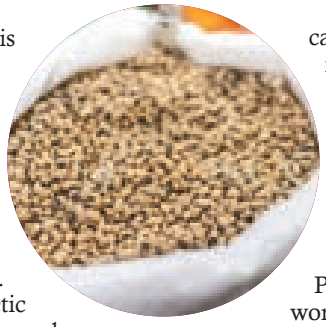
A new University of Toronto study suggests that globally we're growing more of the same kinds of crops, and this is one of the present major challenges for agricultural sustainability on a global scale.

They found that within regions crop diversity has actually increased -- in North America for example, 93 different crops are now grown compared to 80 back in the 1960s. The problem is that on a global scale we're now seeing more of the same kinds of crops being grown on much larger scales. In other words, large industrial-sized farms in Asia, Europe, North and South America are beginning to look the same. The study, used data from the U.N.'s Food and Agricultural Organization (FAO) to look at which crops were grown where on large-scale industrial farmlands from 1961 to 2014.

Soybeans, wheat, rice and corn are prime examples. These four crops alone occupy just shy of 50 per cent of the world's entire agricultural lands, while the remaining 152 crops cover the rest. It's widely assumed that the biggest change in global agricultural diversity took part during the so-called 'Columbian exchange' of the 15th and 16th centuries where commercially important plant species were being transported to different parts of the world.

Global Soy Food Market Size worth USD 56.66 Billion by 2025

Global soy food market is expected to reach USD 56.66 billion by 2025 from USD 36.67 billion in 2017, and is expected to register a growth rate of 5.6% from 2017 to 2025. Consumers' increasing health concerns and awareness of food benefits are resulting in a shift to healthy alternatives. Soy consumption includes cosmetic benefits such as moisturizing and anti-aging attributes which will result in increased consumption, thereby ramping up the growth of global soya food market.



Soya oil is the popular product in the global soy food market due its lower cholesterol levels which help in reducing hypertension, increasing bone density, lowering the risks of few types of cancers, and regulating glucose levels in diabetic patients. The versatile benefits associated with soya consumables are resulting in an increased demand for global soya food market across all regions.

Some of the major soy food production countries include Brazil, U.S., Argentina, China, India, and Paraguay. Together they account for world's 93.0% of soy production.

Major factors driving the increasing acceptance of soya oil is the presence of less saturated fat as compared to other oils. It is a primary source of Vitamin E and omega three fatty acids, which is why consumers are increasingly shifting towards its usage, thereby contributing to the growth of global soya food market.

A fungus that cripples immune system

Scientists have found how a common fungus found virtually everywhere on Earth can knock out our body's defence system, enabling a potentially fatal infection to develop. The fungus Aspergillus fumigatus can be found as a dark grey, wrinkled cushion on damp walls or in microscopically small spores that blow through the air and cling to wallpaper, mattresses and floors, researchers said.

Healthy people usually have no problem if spores find their way into their body, as their immune defence system will put the spores out of action. However, the fungus can threaten the lives of people with a compromised immune system, such as AIDS patients or people who are immune suppressed following organ transplantation.

Scientists develop first fabric to automatically cool a person

Scientists have created a fabric that can automatically regulate the amount of heat that passes through it, helping a person stay cool or warm depending on the weather conditions. When conditions become warm; the fabric allows heat to pass through. When conditions become cooler and drier, it reduces the heat escape. In clothing, the fabric interacts with the heat radiating from the human body."

Depending on the tuning, the fabric either blocks infrared radiation or allows it to pass through. The reaction is almost instant, so before people realize they're getting hot, the garment could already be cooling them down. On the flip side, as a body cools down, the dynamic gating mechanism works in reverse to trap in heat. According to the researchers, this is first textile shown to be able to regulate heat exchange with the environment.

69.8 million hectares farmed organically worldwide in 2017

Organic farming is on the rise across the globe. A total of 69.8 million hectares were farmed organically at the end of 2017, representing a growth of almost 11.7 million hectares or 20% compared to the previous year. These are the latest figures of the report "The World of Organic Agriculture" published by the Research Institute of Organic Agriculture (FiBL) and IFOAM – Organics International.

The study collects data on 181 countries with organic farming activities. Australia has the largest area farmed organically with 35.6 million hectares, followed by Argentina with 3.4 million hectares and China with 3 million hectares. Due to the large organic area in Australia, almost half of the global organic agricultural land is in Oceania (35.9 million hectares), followed by Europe with 21% and Latin America with 11.5%. Currently, only 1.4% of the world's agricultural land is organic, but many countries have far higher shares. In fourteen countries, 10% or more of all agricultural land was under organic management in 2017.

According to the report, there were 2.9 million organic farmers in 2017. Around 40% of the world's organic producers live in Asia, followed by Africa (28%) and Latin America (16%). As in previous years, the country with most organic producers was India (835,200), followed by Uganda (210,352) and Mexico (210,000). Consumer demand for organic products is also increasing across the globe. Global retail sales of organic food and drink reached 97 billion US dollars in 2017, up from 89.7 billion US dollars in 2016.

Chinese Scientists Develop Smart Windows to Clean Air Pollution

A team of Chinese scientists have developed a large-scale transparent smart window that can change light intensity while effectively capturing the particulate matter in smog, a study said.

The study published in the journal iScience described a simple solution-based process to fabricate large-area flexible transparent windows with Ag-nylon electrodes for high-efficiency PM2.5 capture. It takes only 20 minutes to fabricate 7.5 square metres of Ag-nylon flexible transparent windows showing an optical transmittance of over 86 per cent, according to the group of scientists from the University of Science and Technology of China (USTC).

The Ag-nylon mesh can not only change the indoor light intensity, but also purify indoor air as a high-efficiency PM2.5 filter. The scientists found that the obtained Ag-nylon electrodes could be used as an ideal intelligent thermo chromic smart window with excellent mechanical stability. It remains stable after undergoing a bending test with 10,000 bending cycles with a minimum bending radius of 2.0 mm. Also, the Ag-nylon electrodes can remove PM2.5 by 99.65 per cent while remaining stable even after 100 cycles of PM filtration and a cleaning process, according to the study. The design could lay the foundation for next-generation flexible transparent smart windows that can reduce air pollution.

West Bengal Announced New Project for Banana Farmers

The West Bengal government has announced a new project for banana farmers to prevent their produce from rotting and to help them market their produce and get better price.

There are about 3.7 lakh banana farmers in the state and as part of the new project tissue culture banana will be cultivated over an approximate area of 700 hectares in Murshidabad and Nadia districts at a cost of Rs 2322.869 lakh. The state government will monitor the cultivation and for the first 11 months, the government will teach the farmers about the modern ways of farming.

The state government will have share of Rs 930.386 lakh in the project, the participating farmers Rs 933.583 lakh and the Keventer Agro group Rs 458.90 lakh. The Keventer Agro will buy back the produce from growers, ripen the bananas scientifically in their ripening chambers and market through their network. They will also build infrastructures like 'pack house' and 'ripening chamber' which are necessary for implementation of the project.

Punjab offers freight subsidy to potato growers

The Punjab government has decided to release Rs 5 crore for providing freight subsidy to distressed potato growers to enable them to sell crop out of the state. Announcing a series of measures to support potato farmers, the ministry directed the agriculture department to take all possible steps to help potato growers in realizing better prices of their crop.

Potatoes are grown on about one lakhs hectares in Punjab with a total production of 25 lakh tonnes every year. However, farmers are facing problems due to subdued prices of the produce for the last three years.

Farmers claimed that they were facing acute financial crisis as due to glut output of tuber, they were not able to cover even the cost of production. According to Viswajeet Khanna, Additional Chief Secretary Development, two potato processing plants, Iscon Balaji Foods Ltd and Godrej Tyson Foods Ltd, shall soon start processing of potatoes, with a target of processing about 35,000 tonnes of crop in this season.

Indian Market gets access for Australian Walnut

Australia and India have signed a market access agreement to allow the entry of Australian walnuts in Indian market. As per the pact, in the interim period, 10 trial shipments of Australian walnuts will be sent to India before the trade doors officially open.

India is already a large export market for Australian almonds. In 2017-18, Australia export over 22.5 million dollars worth of walnuts around the world. The export value for Australia's agricultural commodities to India has risen by 329 per cent since 2013 and was worth 2.6 billion dollars in 2017. Australia gained market access for blueberries from late 2015, which are now available in stores in India.

Andhra Pradesh suspends licence of top HT Cotton Seed firms

Due to the illegal sowing of herbicide tolerant cotton, Andhra Pradesh government has suspended the licence of one more seed company recently. The State government has suspended the licences of 13 other companies for the last one year.

The State government, which was among the first States to act against the illegal spread of the HT cottonseeds last year, has noticed a similar activity this year, triggering action on the errant firms. The herbicide-tolerant cottonseed technology has not yet received permission from the GEAC (Genetic Engineering Approval Committee), the apex Central government agency that receives and considers applications from agri-biotech companies on new technologies and traits. Various reports from Telangana and Andhra Pradesh had indicated that 20-30 per cent of the total cotton acreage last year was under the illegal HT cotton.

15 states yet to use funds of Rashtriya Krishi Vikas Yojana

A recent study found that India's flagship agriculture scheme, the Rashtriya Krishi Vikas Yojana- Remunerative Approaches for Agriculture and Allied Sector Rejuvenation (RKVY- RAFTAAR) remains unutilized in several states.

Fifteen states and Union territories - including key agricultural states of Punjab and Bihar have not used funds allocated in 2018-19 under the scheme. Only the northeastern states of Nagaland and Tripura have used more than 60 per cent of the funds as on January 25, 2019. RKVY-RAFTAAR is a unique centrally sponsored scheme where states choose their own agriculture and allied sector development activities. It aims at creating pre- and post-harvest infrastructure. The umbrella scheme also promotes innovation and agri-entrepreneur development.

Norway joined hands for a Marine Pollution Initiative

India and Norway signed a letter of Intent for establishing the India-Norway Marine Pollution Initiative. This joint initiative aims to combat marine pollution, which is one of the fastest growing environmental concerns.

Both the governments had agreed to share experiences and competence, and collaborate on efforts to develop clean and healthy oceans, sustainable use of ocean resources and growth in the blue economy. This Initiative will support local governments in implementing sustainable waste management practices, develop systems for collecting and analyzing information about sources and scope of marine pollution and improve private sector investment.

The initiative will also support beach clean-up efforts, awareness-raising campaigns and pilot project using plastic waste as fuel substitution for coal in cement production and developing frameworks for deposit schemes. The letter of intent was signed by the Ministry of Environment, Forests and Climate Change, Government of India together with the Norwegian Ministry of Foreign Affairs.

Govt Revises Fertilizer Export Policy

The Central government has relaxed norms for exports of fertilizers, including urea, potassic and phosphatic.

According to the data, the country imported 42.03 lakh tonne of urea for USD 1,048.59 million till November of this fiscal. During 2017-18 fiscal, imports stood at 59.75 lakh tonne at a value of USD 1,295.72 million. Urea imports were 54.81 lakh tonne worth USD 1,047.28 million in 2016-17 and 84.73 lakh tonne worth USD 2,087.61 million in 2015-16. In case of phosphatic and potassic (P&K) fertilizers, the country imported 52.2 lakh tonne of diammonium phosphate (DAP), 4.04 lakh tonnes of nitrogen-phosphorus-potassium (NPK) and 27.53 lakh tonne of muriate of potash (MOP) till November of this fiscal. In entire 2017-18 financial year, India imported 42.17 lakh tonne of DAP, 4.99 lakh tonnes of NPK and 47.36 lakh tonne of MOP.

The government also plans to revive sick urea units to become self-sufficient. The Directorate General of Foreign Trade (DGFT) laid out procedure to obtain no objection certificate or permission for export of fertilizers. It said that the application for exports should be accompanied with documents including detailed specification of fertilizer to be exported, details of raw materials used for production, and source of raw material used for production.

Goa Govt to handover the sole sugar factory to Agri Dept

The Goa government has decided to hand over the control of sole sugar factory managed by its Cooperative department to Agriculture department, buckling under the constant demand by farmers.

Farmers providing sugarcane to the Sanjivani Sahakari Sakhar Karkhana Ltd have been alleging poor management at the units. The decision to transfer the control of factory from Cooperative societies has been taken at the Cabinet meeting. The Ministry assured that the entire factory would be overhauled. It has been operated on old and second hand machinery. The factory would be upgraded under the Centre's Rashtriya Krishi Vikas Yojana scheme in which 60percent of total funds will be provided by Union government and the remaining will be provided by the state government. In Goa, Sanguem and Dhar Bandora are the regions where sugarcane cultivation is concentrated.

Centre of Excellence for Horticulture will come up in Bengal by 2019 end

A Centre of Excellence in Agriculture and Horticulture with Israeli cooperation is likely to come up in the Hoogly district of West Bengal by the end of 2019. The idea was first conceived in 2013, Israel was then involved in preparing action plans for 11 states in India based on an Agriculture Cooperation Agreement signed in 2006. Now, India has two dozen centres of excellence with Israeli cooperation.

In the beginning of the original plan for the centre in West Bengal, the focus was on potato cultivation. Later it would also adopted Israeli technology in horticulture, mechanization, protected cultivation, nursery, micro irrigation and post harvest management. Under this agreement, the state government also aims to create three packaging houses in each district in a public-private partnership mode.

TAFE to Integrate Farm Services with TN Govt's Uzhavan App

Tractors And Farm Equipment Ltd (TAFE), the country's second largest tractor maker has planned to integrate its farmer to farmer tractor and farm implement sharing platform initiative, JFarm Services and the supporting app with Tamil Nadu government's Uzhavan app.

About 65 per cent of the rural population in Tamil Nadu relies on agriculture as the source of income and around 92 per cent of land holdings in the State are owned by small and marginal farmers with limited access to mechanization. The integration of the two apps will offer farmers information on tractor and farm machinery rental services. The feature allows farmers to rent their existing tractors and farm equipment to other farmers seeking to hire them. The government's Uzhavan app, which offers 12 key agriculture services to farmers, is used by 3.39 lakh farmers in the State.

TAFE's JFarm Services aims to increase easy access to farm mechanization solutions through rental of tractors and modern farm equipment, provide localised weather forecast, latest mandi prices, agri-news alerts and advisory, enhancing their productivity and increasing their income significantly, according to a statement. TAFE has also been collaborating with various State governments to roll out the JFarm services platform.

Insecticides (India) Ltd Launches a Product to Control Bugs in Tea Estates

Insecticides (India) Limited has launched a product for tea gardens in the Northeast to effectively control bugs which have affected crop over the years. This was jointly launched with Indofil Industries Limited, a research-led and fully integrated chemical company. The insecticide can be sprayed at the stages of crop and remains effective even if it rains four hours after the spray.

Tea estates in Assam particularly are susceptible to lepidopteron and sucking pests such as looper and tea mosquito bug. Plantations have been suffering huge losses in terms of quality and yield owing to the presence of the bugs. The new product is a patented combination product of two molecules and has been developed by the research and development team of Insecticides (India) to help planters for better production.

Feedback

We invite your opinion and suggestions on the articles published in the magazines and your comments on the subjects discussed. Please send the feedback with full name, address and Mobile number to aweditor@krishijagran.com or write to Feedback, Agriculture World, Editorial office, 60/9, 3rd Floor, Yusuf Sarai Market, Near Green Park Metro Station, New Delhi 110016.
Tel: 011-26511845, 26517923
Mobile: +91-9313301029, +91-9654193353
Web: www.krishijagran.com

Bayer Crop Science Inaugurates New Formulation Plant in India

Bayer Crop Science Limited inaugurated a new plant at its Himatnagar site in North Gujarat. The company has invested over ₹100 crore at the site. The company has five state-of-the-art formulation plants which is spread over 4.3 acres, and employs 104 full-time workers.

With this plant, the company aims to expand its production of Suspension Concentrates. These eco-friendly formulations will be used in Bayer's Crop Protection and Environmental Science products. The site commenced operations in 1991 with the production of Folidol dust formulations. Over the years, it has undergone significant changes with the introduction of new generation formulations like Suspension Concentrates (SC), Water dispersible granules (WG) and Oil dispersion (OD). Today, the site is a major exporter of WG products to various regions across the world.

MoooFarm introducing Mobile App for Dairy Farmers

MoooFarm, an Australia-based innovative agri-tech company has launched its mobile app 'MoooFarm', which provides end-to-end last-mile connectivity solutions to small dairy farmers. According to the company, the app helps to build a self-sustained dairy farming community by leveraging ICT applications, creating employment opportunities for the youth, financially empowering women, and doubling farmer income, in accordance with the Government of India's vision.

MoooFarm will also leverage data analytics and harness the power of big data to get real-time dashboard on the impact on the productivity and income of dairy farmers. Analytics based on milk, herd, breeding method, health, productivity and extension can be derived from the data captured through the app, leading to informed decision-making for all the stakeholders involved.

The app is bolstered by a network of Village Level Entrepreneurs (VLEs); the company deploys one VLE for every two-three villages covering about 100-150 farmers. The VLEs, along with experts, visit each farmer's doorstep for training on ICT and dairy best practices. The VLE has 36 touch points with each farmer via dairy awareness camps, door-to-door visits and MoooFarm community meetings. The VLE app allows the VLEs to ensure successful implementation of dairy best practices and monitor the active usage of the mobile app by the dairy farmers. ARE

Cargill India to invest ₹140 crore for Animal Nutrition

Cargill India has announced plans to invest about ₹140 crore ($20 million) to set up a greenfield premix plant to manufacture animal-nutrition products and supplements in Rajasthan.

According to the company, the state-of-the-art plant would be spread across 15 acres of land in Kota, Rajasthan, and would have a monthly manufacturing capacity of 7,500 tonnes of animal nutrition products and supplement. It will serve consumers not just in Rajasthan but also in other regions of North India as well as export markets. Cargill Animal Nutrition is a global business unit within the company. In India, the company serves farmers in dairy, poultry, and fisheries sectors.

Dr. Geeta Kochhar

Assistant Professor (Chinese)
Jawaharlal Nehru University,
New Delhi

Agriculture in China
'Eliminating Poverty' to build 'Well-off' Standard

As China grappled with inefficiency in the agricultural industry, it is now spending billions on agricultural technology or AgTech to maximize resources.

China is a fast developing country that has been rapidly transforming from an agrarian country to a modern urbanized country. In 1949, China was having more than 80 per cent rural population, but now the urbanization rate has crossed 50 per cent. It has world's 21 per cent of the population, but only possesses 8 per cent of arable land. In terms of the land per capita, it is one-third of world average, which means faming land per capita is only 1.39 mu (less than 0.1 ha). Hence, more than 90 percent of China's farmlands are small and they are smallest in the world.

In addition, rapid urbanization of land is eroding millions of hectares of arable land and an estimated one-fifth of the land is polluted and not worth cultivation. According to official statistics, 40 per cent of China's arable land has been destroyed due to pollution and climate change. It is stated that out of the 334 million acres of arable land, approximately 37 million is polluted or is left for restoration.

Yet, if we see the success China has made in self-sufficiency of grains and reduction of extreme poverty, it is an exceptional model for most developing economies. The numbers of rural poverty also shows a sharp decline from 250 million in 1978 to 10 million in 2018. The question then is, how has China achieved such success and what are its plans for future? How is it that an agrarian country similar to India with huge population is able to deal with the issues of food security, environmental damage, climate change, and protection of farmland? For understanding this, we need to see the course of reform and development of China in the agricultural sector along with the plans for its development.

Reform of Agriculture: Post 1978

By the end of Great Cultural Revolution in 1976, peasants in China were starving due to some adverse policies of collectivization. The Great famine in the mid-1970s added to the disaster and peasants in many areas were facing hardships of subsistence. A small village in China's Anhui province -Xiaogang, took a different approach to farming than the official line. It mooted the idea of 'contracting'. The idea that was later formalized as 'household contract responsibility system' based on the pilot project of Xiaogang changed the lives of many peasants, eliminating extreme poverty, boosting incentives to work, and increase in peasants income. By 1986, Chinese government issued guidelines on Rural Work, which abolished the people's communes that were based on the notion of collectivization. Reforms in agriculture has been the focus of Chinese government since 1978 with three objectives on resolving the rural issues termed as 'san nong', which is to raise peasants income, improve agriculture productivity, and modernization of rural areas.

With this focus, China has embarked on a multi-pronged approach. On the one hand, institutional reforms were initiated which brought in contract responsibility system and reduced taxes; and on the other, there was investment in the rural areas to improve infrastructure. Alongside, emphasis was laid on technological change and market reforms. In terms of reducing the taxes, since 2004, Chinese government has abolished more than 50 kinds of taxes and fees levied on peasants and introduced direct subsidy programs. The subsidies were mainly provided for grain production, quality seeds, and machinery. Besides, temporary storage programs for maize, soybean, rapeseed, cotton, sugarcane was launched aimed at raising the market prices. These were supported with the minimum procurement price that was started for rice in 2004 and for wheat in 2006, but completely abolished by the year 2016. It is in the year 2016; China also merged all subsidies on grain and seeds with a single general income support program.

Current Issues in Agriculture and Future Visions

In the new century, China faced the critical issue of small farmland. The debates hovered on how China can achieve industrialization in agricultural products if the sizes of farms remain medium or small. The other critical issue was whether farming should remain labor-intensive, involving small farms seeking high-value agricultural production, or capital-intensive large farms. However, China made no plans to merge the small-farm holding into Kansas-style farms, which will create turbulence in Chinese society and will make millions of peasants redundant. Instead, Chinese government has relaxed rules on leasing and transferring of the farmland that still has collective ownership in order to improve efficiency. It is also forming clusters of farms to build economies of scale.

Specialized farmers' Cooperatives are increasing with around 2 million registered by the end of November 2017, according to the Ministry of Agriculture and Rural Affairs. It is reported that the registered cooperatives have more than 100 million rural households, which is 46.8 per cent of the total.

In October 2017, Chinese President Xi Jinping, who has his doctorate thesis on 'rural marketization', unveiled a plan on rural revitalization that priorities agriculture. The 'Document No.1' as it is called, outlines the National Strategic Plan for Rural Revitalization from 2018 to 2022. The document stresses on making progress in rural rejuvenation by 2020, modernization of agriculture by 2035 and affluent peasants with a strong agriculture sector by 2050. It also calls for upgrading of farm machinery, accelerating the development of modern crops and the development of digital agriculture. The vision

clearly is to prepare China for a sustainable 'green' agriculture, expanding the scale of agriculture production, and using new ways for agricultural financing. It must be noted that China has also set a national red line for arable land at 1.8 billion mu or 12 million ha that cannot be converted for any other purpose or use.

Technology Reshaping Agriculture

The Chinese government in the agricultural sector vigorously promotes the use of technology. Recently, China launched a seven-year autonomous agriculture pilot programme in Jiangsu Province to test a range of automated farming technologies, such as unmanned combined harvesters or robotic tractors. China has 1.4 million combined harvesters and 14.31 million irrigation and drainage equipments by the end of 2016.

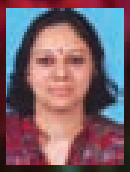
If we see Jilin province as an example, we can find that it has more than 80 per cent rate of agriculture mechanization. The province has nearly 600,000 large and medium-sized tractors. Apart from the government support and encouragement, individuals, peasants and cooperatives are also experimenting with new techniques to bring in mechanization of agriculture. In Nong'an, a major grain-producing county in Jilin Province, a drone flies above the crop fields, spraying a white mist of chemicals. It is stated that the drone is five times more efficient than tractor sprayer. The county also uses an automated exhaust system and solar energy equipment for lowering the temperature or for heating purposes.

As China grappled with inefficiency in the agricultural industry, it is now spending billions on agricultural technology or AgTech to maximize resources. In early June 2018, Alibaba, a Chinese company, launched the 'ET Agricultural Brain' - a digital tool to help peasants raise crop yield and income by leveraging big data. The technology allows peasants to digitally record all information relating to their yield by way of which they are able to take control of entire production cycle, raise efficiency and capacity. The program is vigorously used especially in the pig farming in whole of China.

Today's China is no more a labour dependent agricultural based-economy. It has a goal to eliminated rural poverty by 2020. Although, the state has still kept the ownership of the land, but the right to use of land to cultivate are with the villagers, who are encouraged to experiment new innovative techniques for improving efficiency and raising their incomes. Even if the gap between the urban and rural incomes remains high, the vision of China is to fully modernize its agriculture with the use of advance techniques.

Agrarian Reforms and Development Models in China
An Analysis

Ritu Agarwal
Associate Professor
Jawaharlal Nehru University, New Delhi



China has recently issued a Circular on Comprehensive Deepening of Rural Reforms and accelerating agricultural modernization, which has further emphasized rural economy with market in a more efficient manner.

China has undergone a series of economic reforms since 1978 and it started from the rural areas. The reform in the agricultural sector was the first to be established to eliminate poverty, improve the lifestyle, and increase in agricultural production. A series of institutional changes and policy initiatives gave a new push to material incentives, profit maximization that brought prosperity in rural areas. The rural areas were the initial catalysts in rethinking new strategies about the production method, its organization and management. Peasants were given freedom to take independent decisions regarding the agricultural production as to what to grow, where to sell and how to earn income. The peasantry and the countryside have always been the policy concern for the Chinese government. The government from time to time has introduced different schemes like land reforms, mechanization and irrigation methods helped to motivate farmers to work on the land.

Agriculture was given the topmost priority in the economic modernization of China. One of the most successful reforms in this direction was the introduction of Household Responsibility System that began in early 1980s and it has linked agricultural production with income. Farmers were given new freedom to work on the land that was distributed to them according to their household size and its members by the village collectives. The land which was given to the village households on the lease basis gave the production and management rights to farmers. One could witness a new enthusiasm and energy among the peasantry in the rural areas where different local experiments were undertaken in terms of production and marketing decisions. Different provinces in China have adopted region specific agrarian development models.

Free markets were established where the peasants could go and sell their agricultural produce. The spread of free market gave a new income opportunity to the farmers. It has resulted in a vast change in China agrarian landscape. The peasantry were engaged in grain cultivation, cash crop production and other sideline activities. The peasant households became the self-sufficient economic units where they could also keep grain


200
Veronica

harvest for their household consumption and concentrated on other cash crop and sideline production that could give extra income to them. This amalgamated in the construction of their houses, educating their children in better schools and could get better access to social security benefits. The local government also significantly improved the basic infrastructure where one could witness the building of roads and highways connecting the villages with the nearby urban areas. Another significant transformation was seen in terms of rural industrialization. With new mechanization and technological advancements, the agrarian production had significantly improved. The large amount of surplus labour thus available also got absorbed in rural township and village enterprises.

The government drafted a new concept of rural development that was more comprehensive in nature. In the early 1990s, the main theoretical model to develop new political awareness about agrarian development was the concept of 'Sannong' which included three important agrarian issues which are agriculture (nong ye), countryside (nongcun) and peasants (nong min). So, the rural development comprised of increase in agrarian production, development of rural countryside and increase of peasants' income. Since then, there were different policies adopted towards linking agricultural production with increase in peasants' income. The main idea was to bridge the gap between rural and urban areas. Sannong as an integral concept broadened public awareness of countryside from solely agricultural production to the development of rural society and peasants.

Since 2005, Chinese government had further deepened its understanding about agricultural and rural problems. As a result new concepts such as Construction of New Socialist Countryside had been initiated. The main idea of this concept was making the agricultural production more specialized in nature and this resulted in the large-scale greenhouse cultivation of specialized crops. The agricultural production was linked with the market and it resulted in a new model of agrarian development.

One was the model of agro-tourism, "Nongjiale" mainly in suburbs of big cities, building high-tech farms, new countryside with unique agricultural landscape. It has resulted in the sharp increase of farmers' income, in addition to create new employment opportunities and thereby lifting a huge population out of poverty. Currently, every year agro-tourism receives 500 million tourists creates 300 billion RMB, benefits more than 24 million peasants in 20000 villages in China.

Another model was to link rural economy with market production. A significantly huge gap exists between the rural and urban and rural to urban migration has created a new social hierarchy in China. The main attempt in the direction was the

entry of dragon-head agrarian enterprises that could bring more commercial benefits in terms of income. China is facing a significant loss of high quality arable land and hence the pressure on the Chinese government to prevent migration from rural to urban areas and hence it has resulted in a new experimentation in rural areas. Emphasis was on creating different land lease models that has emerged in China where the farmers can rent their land to other peasant families or rent from the government. In some cases, local governments rent or lease land from the farmers and subcontract it to the agricultural enterprises

who could bring about a change by adopting new technologies, seeds, fertilizers and market which could make these agricultural products more competitive in the current scenario. More profits could be brought about by these large-scale agrarian ventures. This model uses one particular cash crop as a model of highly commercialised and specialized agricultural production.

China has been issuing Central Document No. 1 which has been focusing largely on issues related to agrarian transformation. China has recently issued a Circular on Comprehensive Deepening of Rural Reforms and accelerating agricultural modernization, which has further emphasized rural economy with market in a more efficient manner. The policy document states that there is also a need to further modernize and industrialize the country's rural areas. There is also a need to make agricultural production more mechanized, establish new linkages between business and research institutions in agriculture and more innovative science and technology for agriculture. It also plans to build additional infrastructures for communication and transportation channels that can better connect rural farming sites to

the market. These reforms led to establishing of different kinds of agricultural value chain between agrarian enterprises, market and the peasantry. China has started a huge supply chain of daily commodities of vegetables and fruits production in different provinces.

Thanks to the agro-industrial cluster model being developed by the provincial government Yunnan has emerged as a leading province in flower industry for China and neighboring Southeast Asian countries. The Yunnan province was visited last year and so we were able to witness a massive agrarian transformation the province had undergone. The province has changed the agrarian production from grain cultivation to a variety of cash crops like flowers and fruits production, ornamental seedlings, edible flowers as well as developing markets centered on flower art, healthcare products and other industries.

Kunming is a small city in the Western Yunnan Province. The government has started a huge flower market known as Dounan Flower market in Chenggong County located near Kunming Municipality. Chenggong was classified as a meeting place for China's flower festival by the Provincial and the Municipal government. Dounan flowers sales exhibition was held at Dounan market. The success of the sales exhibition resulted in the building of the Kunming International flower transaction centre and auction market at Dounan. In December 2002, Kunming International flower transaction centre and auction market was built and it and started operating with the help of investments. The opening of the Kunming Changshui International Airport in 2012 facilitated the overseas access. This helped the Chenggong flower industry become more professional and more global. The province is now trying to make itself the largest flower production and market center in Asia.

With development in science and technology, Dounan promoted speedy development and industrialisation of the flower industry. It also assembled many international flower specialists,

scientist and technicians to provide further impetus to the flower industry. The industry was illustrious enough to engage the Provincial agricultural science department, provincial plant research bureau and other such scientific research units. International specialists from Japan, Holland etc were invited and lectures would be given on cultivation and management. In the past decade, they held classes on the different flowers that needed to be grown in the whole year. Rural population had been trained, flower business. The flower production expert people had been send to Guangzhou, Shenzhen, Shanghai, as well as to Japan, Holland and Australia to learn. They have been using latest biotechnological advances to breed sterile and robust sprouts. Every year, new sprouts are provided to the farming households. This guaranteed the development of the Dounan flower market. The flower industry has also promoted the development of the tertiary service sectors such as food and beverage, transport, merchandise etc.

The flower industries of other provinces of Yunnan and other cities and neighbouring countries supported and gave strength to the entire Dounan flower market. They also triggered supplementary industries such as flower packaging, transport, sales as well as production of basic infrastructure, providing of goods, scientific technology, technical services etc. These again helped further develop the flower industry.

With increase in transactions, the fame of the place spread and "Dounan flowers" became a famous brand for fresh flowers within and outside the country. People concerned believe that, in Yunnan, "Dounan flowers" comes right after the "Hong ta shan" brand. By 2000, the total area on which flowers were cultivated increased to 50.12% of the entire province. The variety of flowers increased to 50. The value of production increased, which was 20.3% of the total value of agricultural production of the entire county. According to various literature estimations, it is so said that by 2020,950,000 tons of flowers will be able to be transported by air from the Kunming airport. It is quite a wonder that in just three decades the town has expanded into one of the world's biggest flower markets from a rural area to supplying over three quarters of the country's cut blooms and exporting throughout.

Chenggong has already become the number one flower county of China in the true sense of the word. Now Chenggong has developed an agro-industrial cluster model where big agrarian enterprises are investing heavily in the cash crop production. They are providing new techniques and market information thus bringing the flower market to a new height. It has now not only employed the people within the Yunnan province buts also gave new income earning opportunities to the people from other provinces. Yunnan is a favourite destination for the visitors as well who want to explore the fresh cut flower industrial model encouraged and developed by the provincial government. The agro-industrial model of Yunnan has earned a unique specific advantage and it has developed a huge export market to the nearby neighbouring economies to Southeast Asian countries as well. This model has not only prevented migration from villages to cities but attracted migration from the other provinces in search of employment in these industrial sectors.

Yunnan flower industry has become a huge flower industry in Asian Agricultural market and provided new impetus to rural modernization and prosperity to the Chinese farmers. With this new hope, the provincial government wants to increase the farmers' income and create new venues of attaining wealth by expanding the scope and size of this agro- industrial cluster model in the coming years to come.

Dimple Tresa Abraham
Centre for Women's Development Studies, New Delhi.

Abi Antony George
Reaearch Scholar
St. Xavier's College, Mumbai]

Like India, China had enacted land reforms,though much earlier, between 1949 and 1952 when it distributed 47 million hectares of farm land owned by landlords to 300 million land poor and landless peasants.

Rural Transformation in China & India
Shifting Policies

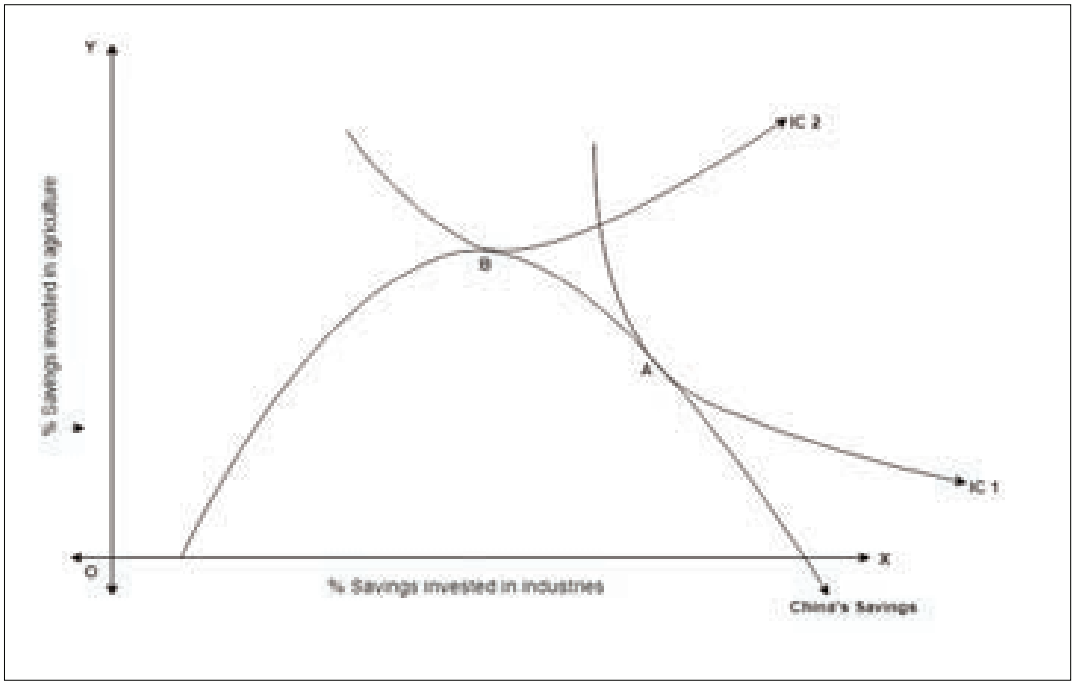
Since the 1940s, China and India has constantly evolved and developed though transformation has been significantly remarkable in the case of China. Between the Asian giants, there have been many comparisons on similarities and dissimilarities with respect to political economy and organisation of economic production system. While the Chinese economy may be more capitalistic now, its socialist past has provided a solid base, particularly with respect to social infrastructure (broad-based education and health for all), progress in rural electrification (facilitated growth of agro-processing and rural industrialization) and regional economic decentralization. Even before economic reforms of 1978, county governments were in charge of production enterprises, which had created a pool of manufacturing experience and networks that further helped evolution of earlier commune systems to highly successful township and village enterprises (TVEs). This was the bedrock for the country that became the manufacturing base for the world. China invested heavily in the industrial sector through the establishment of Special Economic Zones (SEZs) in Guangdong, Shandong, Fujian and more. But apart from Xinjiang, all the other SEZs were located on the eastern coastline, and hence, the internal part of China was left behind.

State of Agriculture

India and China possess second and third highest cultivable area in the world, with both having smaller sized farm holdings. Average land holdings in China are just about 0.6 hectares while in India it is marginally higher at about 1.15 hectares. But despite small farm holdings, the productivity of most crops, wheat, rice, vegetables and fruits are all much higher in China. This owe to agricultural R&D that has produced high-yielding and quicker-growing crop varieties, higher fertiliser usage, growth promoting agents (which has raised concerns of food safety) and assured irrigation. But both countries also faces climate related stress, particularly water availability which is critical for sustainable agriculture. In addition, there are also problems due to desertification, over usage of chemicals and fertilisers which has further caused environmental degradation and food safety issues.

Globally, China has the largest irrigated area (69.1 as compared 67 million hectares in India), and has become more vigilant with respect to water usage. It has adopted a focussed approach in water management, regulating the irrigation water quota (volume of water per unit irrigated area) with strictest norms right from the 1990s. Focus on water management was backed by heavy investment in its 12th Five Year Plan (FYP) which saw more than RMB139 billion-irrigation investment. At present it has close to half of its irrigated area under micro irrigation systems (drip/sprinkler), which it plan to raise to 64% by 2020 and 75% by 2030. In addition it has taken measures to curb ground water extraction, through tough measures such as the 'Three Red Lines' water pricing policy, which makes ground water expensive wherever ground water levels were stressed. Implementation of drastic policy measures such as these may be easier in China with its one-party political system, whereas in India it may be tougher as a multi-party pluralist democracy may not show enough political will to take such tough measures. Political fortunes depend of rural electorate, and any policy seen as anti-farmer may lead to downfall of governments, which may be why the Indian Central and state governments decided upon direct support schemes to farmers during the last two years, the most recent one in the Union Budget of 2019.

With respect to land, China has tried and tested various models of land ownership and utilisation. Like India, China had enacted land reforms, though much earlier, between 1949 and 1952 when it distributed 47 million hectares of farm land owned by landlords to 300 million land poor and landless peasants. India did enact land reforms, between mid-1950s and through sixties across states, aiming to abolish landlordism as well as to achieve redistribution of land to the



Savings Curve describing proportion invested in agricultural and industrial sector

rural poor, but redistribution goal met only partial success and that too in very few states leading to extreme land inequality.

In China, all private land ownership was abolished with introduction of collective land ownership during the mid-50s but it had negative impacts impoverishing rural society as a result of insufficient food grain production. Later, in the late 70s, rural land became collectively owned and was contracted to rural households based on the 'household contract responsibility system' with two models, *Baochandaohu and Baogandaohu*. In the first, only output was contracted for a fixed area of land, while in the second in addition to land, capital and other inputs were distributed to households who could retain and sell surplus after paying taxes. Since 2014, households had the right to lease land of others which was to overcome a new *San-Nong,* (meaning rural problem) which was hollowization" of rural villages. The main rural reforms followed by Chinese government since 1978 were aimed at tackling rural issues (*San-Nong*), namely, raising peasants income, improving agriculture productivity, and modernizing rural areas.

Hollowization of villages occurred due to industrialization in urban areas and relaxation with respect to the *hukou system* which had attracted farmers to migrate to and live in cities. The opening up of land lease markets would lead to better utilisation of assets and generate additional incomes to farmers. Statistics indicate that by end of 2016, there were about 250 million mu (16.7 million hectares) of homesteads in China and around 479 million mu of contracted farm lands put up for "circulation" in the market. Chinas' policy with regard to opening up of land markets is worth emulating for India, a case for which was also advocated by the *Niti Aayog* in its Model Land Leasing Act, 2016.

Movement out of Poverty

A remarkable lauded achievement of China has been moving 500 million people out of extreme poverty since 1981 till 2012 (World Bank, 2012). This owes to the fact that it has invested heavily in farms and rural infrastructure and some attention was paid to balance rural industries along with agriculture development. Although China has rapidly reduced poverty levels in the country, it has not been uniform across its regions. The coastal regions of China, as well as the major cities constantly show progress, and have become the benchmark for economic progress. It is the rural and the inward parts of China which face the brunt of poverty, and thus, economic inequality is extremely high in China (but lesser than India).

Higher Investments in Agriculture

China's key medium-term challenge is to manage an orderly transition to a slower but more balanced and sustainable growth, thereby securing a sustainable path. In May 2014, President Xi Jinping introduced the term "New Normal" to describe an economy with lower but more efficient and equitable growth, and "New Ideas, New Thoughts, New Strategies on State Governance" are reflected in China's 13th Five Year Plan (FYP) 2016–20. The National Strategic plan for rural development launched in February

2018 also laid a three-step focus in its Document No.1. The plan lays out rural rejuvenation with complete eradication of rural poverty by 2020; Modernisation of agriculture and rural areas by 2035; and building strong agriculture sector aiming overall prosperity of farmers by 2050. This would mean increased investment in agriculture from domestic savings as well as external funding.

The figure I may depict the focus and priority which the government of China has given to agriculture and industrial sectors. The savings curve indicates the savings China should ideally be able to generate (depending on GDP and saving to GDP ratio). The indifference curves IC_1 and IC_2represent the contentment China obtains by investing its savings for agricultural or industrial growth. Contentment is synonymous with productivity in this case, and hence, from the diagram, China is clearly deriving greater contentment by using its savings in favour of industrial growth, as more savings are being utilised efficiently (compared to agriculture sector).

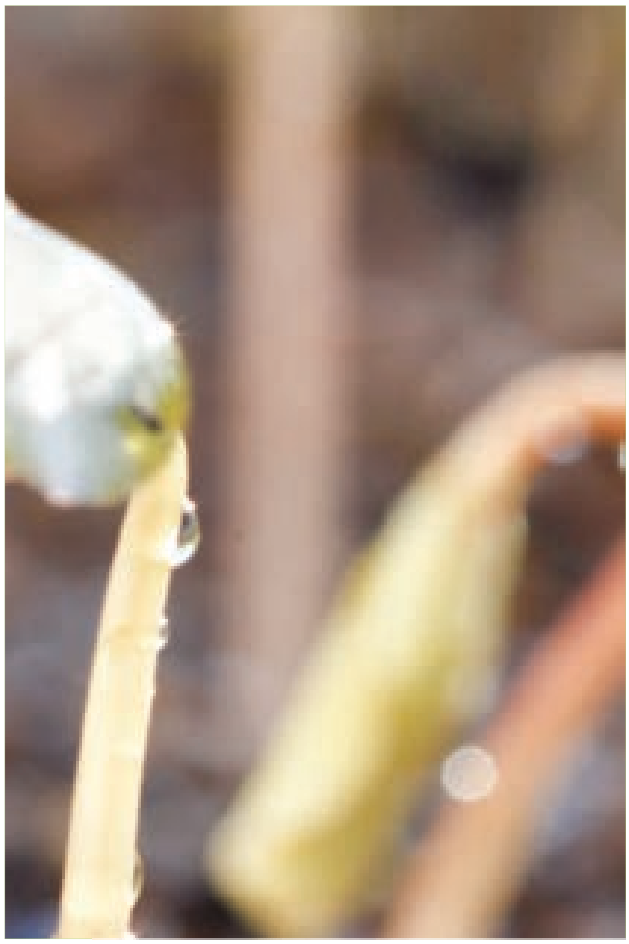
Since 1978, China may have employed more of its savings at equilibrium point A, which shows a greater preference towards the industrial sector as compared to agricultural sector as it prioritised 'efficiency over equity'. The reason for such a strategic decision has been China's aspiration for global superiority in manufacturing. Almost every product we see is 'made in China', and for achieving such a global reach, they had to invest heavily in the industrial sector.

Manufacturing had leapfrogged due to cheap availability of labour, lesser government regulations, higher production capacity and superior technological capability.

This move rationally is correct, as incremental capital output ratio (ICOR) in industry is higher. The only issue is that China as well as India are labour intensive countries, and hence, policies need to be implemented in such a manner that more employment is generated for unit capital invested. Given its priorities for agriculture and rural development laid out in the Document No.1 of 2018, China may move to Point B which would ensure higher investment in developing sustainable agriculture and more inclusive development.

The preferred operational point should then be point B, as it aspires for equality between investment of savings in agricultural and industrial sectors. While it may not be operating at point B currently, concerns for the 'new normal' as envisaged by political leadership may push up investments in agriculture for a sustainable future. Improved connectivity and infrastructure development, particularly the planned Belt and Road Initiative (BRI) may also open up new possibilities for trade for rural China and its agricultural products provided China rein in its chemical usage and ensure there are no more scandals related to food produced in China. This would help to improve farm incomes and achieve its goal of attaining higher rural prosperity by 2050.

Edi Chen
Managing Director& President,
Summit Agro China



China is home to one fifth of the world population with more than 1.3 billion people. The cultivable land size in the country is one-seventh of the world and it is the land of 700 million farmers. Agricultural labour in China equals to be 52% as against 5% in Europe and just 2.2% in U.S.A. EBIC reports China to be the most populous country on Earth and says China should be concerned perhaps more than any other with being able to meet growing demand for food, feed, fibre and energy crops with the fewest unwanted impacts. Also reiterates on the fact that China is a critical player in the movement to make global agriculture more sustainable. In 2015, the Ministry of Agriculture of the People's Republic of China announced the goal of achieving reduction in the use of pesticides and fertilizers by 2020, which undoubtedly promoted the development of environmentally friendly products such as biostimulants in China.

Global Biostimulants Market Insights: Forecast to 2025

Increasing yields, improving food quality and safety and thereby depreciating the detrimental footprints across the globe in the coming decades is challenging. The Crop Protection Industry

Biostimulants

Market Insights and Challenges in China

is persistently researching and evolving new products for the farmers. Bio Ag solutions are the latest entrants into the industry and they are very much befitting the needs of the environment, a must for integrated crop management, when it comes to sustainable agriculture.

A business intelligent report by Advance Market Analytics states that the rise in demand for sustainable farming practices and growth in research on cost-effective production processes is driving the Global biostimulant market. The major market driver is the rising awareness of bio stimulants as a conscious choice of adopting sustainable farming practices, coupled with the growing organic food industry.

Biostimulants emancipate powerful interactions within plants and between plants and the beneficial microorganisms in the soil. Biostimulant acts as catalysts to improve the plant quality, quantity, growth, enhances the

The current registration status of bio stimulants in China

Category (Active Ingredient)	1st Registration time	Current number of Reg.	Market Share (Estimated)	Standard
Humic acids	1990	2508	45%	Y
Amino acids	1993	2399	30%	Y
Seaweed (Alginic) acid	2001	245	17%	N
Chitin	2009	245	5%	N
Microbial	2018	3	3%	N

Data:Edi Chen

overall crop production which inturn improves the yield and antioxidant capacity. Biostimulant helps in improving microflora, which in turn improves nutrient uptake, reduces plant stress and the hormones in plants stimulate growth, root development, and cell enlargement thereby aiding the vigor and overall health of the plant.

Current Trend

Giuseppe Natale quotes in Agribusiness News Global that the forecast reports the global bio stimulant market is valued at about 1.3 billion USD. Among which China is known to contribute about 200 million USD. China plays an important role in the global market of organic fertilizers. It can be called neither a global importer nor exporter of Organic fertilizers. It imports around 4000 Mt/kl, mainly from Europe and North America. China exports about 44,000 Mt/Kl of organic fertilizers, majorly to Japan (21.9%), Taiwan (21.4%) and South Korea (14.4%).

Humic acids, Aminoacids, Seaweed, Chitin and Microbials represent the biostimulant products. Seaweed extracts are obtained from the marine green algae. The great source of Humic acid is soil and Humic acids act as plant growth stimulants. Aminoacids contain plant growth regulators and trace elements required for the plants. Seaweed extracts are abundant in minerals and vitamins and has a great influence on improving the soil. Chitosan and Microbials play a major role in increasing the crop yield and improving the quality of the plant. The current registrations for Biostimulant products and producers are on the increase in China.

The well-known biostimulant producers in China are:

- Valagro, Italy
- Biolchim, Italy
- Stoller, USA
- Miragro, Italy
- Van Iperen, Holland
- ADOB, Poland
- Acadian, Canada
- Italpollina, Italy
- Kelp, South Africa
- COMPO, Germany

Growth Prospects

The bio stimulants are now mostly used for crops, such as cereals, oilseeds, fruits and vegetables, and turfs & ornamentals. The use of bio stimulant products is relatively well known and popular in fruit and vegetable crops. The environmental concerns over high chemical usage in agricultural lands and the popularity of precision farming have also led to a new growth opportunity in the mainstream crop segments such as cereals and oil seeds.

As per estimates, by 2020, the global market value of bio stimulants will reach 2-3 billion USD with an annual growth rate over 10%. Subsequently, in the next 3-5 years, the market value in China will also reach 400-500 million USD.

Edi Chen, the Managing Director of Summit Agro China, the first foreign invested agricultural chemicals distribution Company in China stated at the BioAg World Congress that China would be one of the largest bio stimulant exporters in the near future. Also, possibly the 'Chinese medicine' bio stimulant shall be launched very soon that may transform the current bio stimulant market structure.

When asked about challenges the Industry is facing in China, Edi Chen reiterates the fact that the current lack of regulation is creating

an impact in the market growth. There isn't a whole some understanding as to how and what safety the Biostimulants can offer the Agriculture Industry, till now. Much more emphasis on research and development needs to be created. However the regulatory procedures are getting evolved emphatically and conclusively. Currently the market needs to focus on quality products for emancipating the potentials of these products in the agricultural sector.

China being the highest in Energy consumption and taking matters of sustainability very seriously in the recent years, more attention is definitely being given to biostimulants to reduce the environmental impact and excellence of the food products. There has been an increase connect with people these days, as more and more awareness opportunities have been created within the country and also investment opportunities. Edi Chen also emphasizes the need for highly qualified and dedicated professionals to approach business in a very serious way and also demands genuineness in all aspects of the products released as biostimulants. Let the concept of sustainability spread around creating less footprints on the world we live and also for the betterment of the coming generations.

Dr Lakshmi Unnithan
Editor, Agriculture World
Sheetal Dhamecha, Staff, AW

A Need for Sustainable Development: China A Review

Over the last couple of decades, bewildering economic growth has become synonymous with China...

Growth Scenario of China: An Overview

Depleting resources, population increase and dwindling agriculture area is a global issue that needs to be confronted better late than never. Demand of an increase in Global food production by 60 to 110 percent by 2050 and the increase in Global Greenhouse emissions are impending problems.

As quoted by UNDP records, in 1978, China's economy was smaller than that of the Netherlands, now it is the world's second- largest. It is awe-inspiring to learn that China feeds 22 % of the world's population. Rural and urban per capita incomes have both risen more than hundredfold over this period. As early as 1980's, China has started lifting people out of absolute poverty and an estimated 400 million have been lifted out, and it now has a prosperous middle class.

Indeed, over the last couple of decades, bewildering economic growth has become synonymous with China. The country has world's best highways, high-speed railways, ICT networks, power transmission, across China's large area. Financial services, including microfinance, often internet or phone-based, have reached even the most remote parts of the country.

Much alongside the astonishing economic growth, we find China topping the list in Energy Consumption, the world's largest energy consumer since 2009 according to the Global Energy Statistical Year Book 2018. China also tops in being the World's top carbon dioxide (CO2) emitters, the next in line being The United States, The European Union, India, The Russian Federation, and Japan. The strong economic growth has pushed China's Coal consumption, which is responsible for nearly half of the coal world demand, despite its coal-gas switching policy that had maintained its emissions from 2014 along with the government's willingness to decarbonise the economy and limit air pollution.

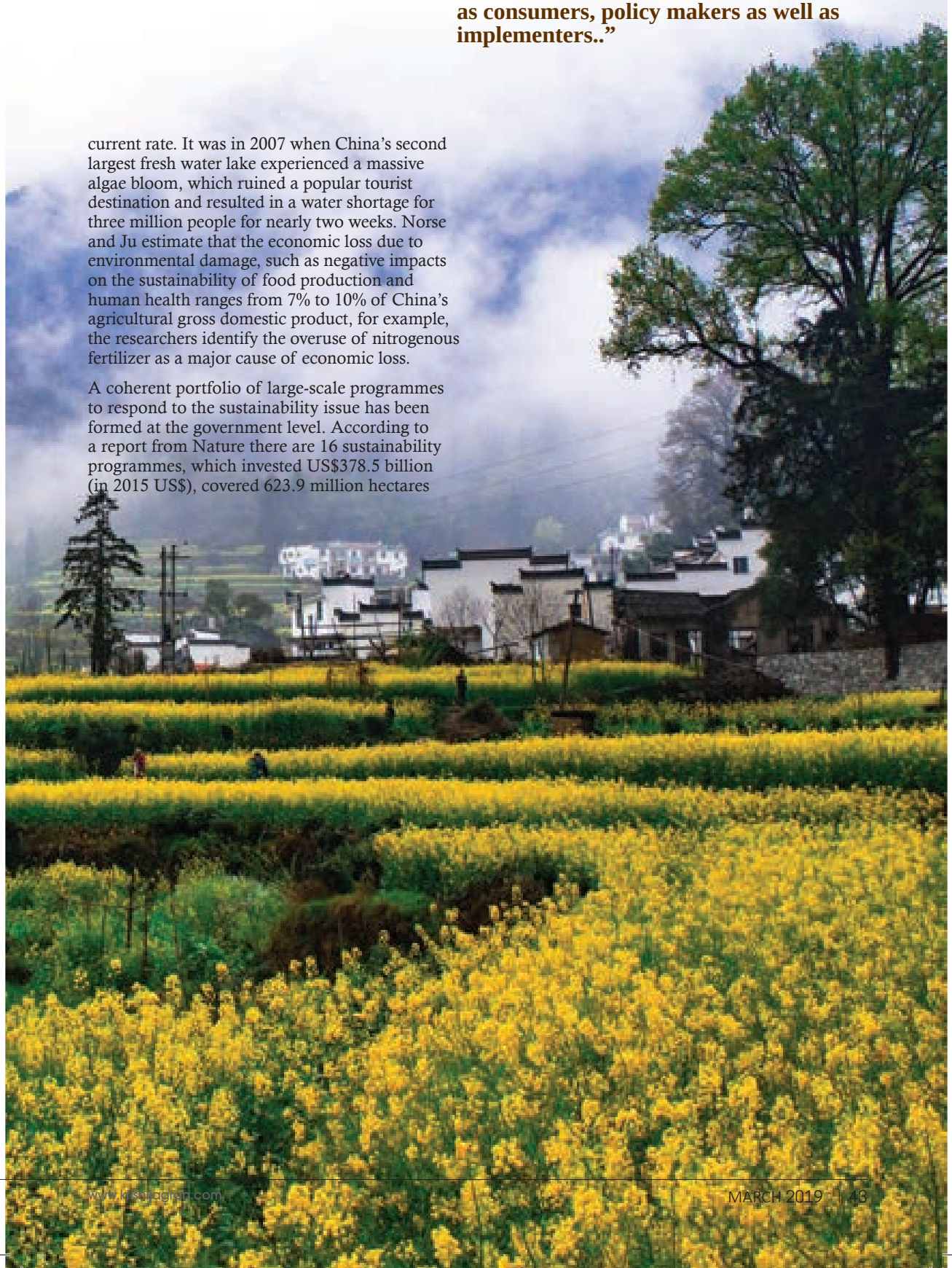
The Global Agricultural sector also saw China being the World's largest consumer of agrochemicals and pesticides and that too only on 9 percent of the world's cropland. This has together resulted in severe environmental damage which not only would affect food security in future but also have impacts on other socio-economic aspects. *Professor Deli Chen and Dr Baojing Gu, University of Melbourne, reports that* from excess nutrients entering water bodies caused algal bloom (eutrophication), the formation of harmful PM2.5 particles in the air and greenhouse gas emissions (global warming); and this presents immense challenges for agricultural sustainability now and for the future of China. A government report published in 2008 estimated that 100 million Chinese could lose the land they live on within 35 years if soil erosion continued at the

Author credit:Brett Bryan and Lei GAo

"Ensuring Sustainability is to create ensuring Awareness of the same. Awareness in the minds of farmers as well as consumers, policy makers as well as implementers.."

current rate. It was in 2007 when China's second largest fresh water lake experienced a massive algae bloom, which ruined a popular tourist destination and resulted in a water shortage for three million people for nearly two weeks. Norse and Ju estimate that the economic loss due to environmental damage, such as negative impacts on the sustainability of food production and human health ranges from 7% to 10% of China's agricultural gross domestic product, for example, the researchers identify the overuse of nitrogenous fertilizer as a major cause of economic loss.

A coherent portfolio of large-scale programmes to respond to the sustainability issue has been formed at the government level. According to a report from Nature there are 16 sustainability programmes, which invested US$378.5 billion (in 2015 US$), covered 623.9 million hectares



of land and involved over 500 million people, mostly since 1998. We find that the interventions improved the sustainability of China's rural land systems, but the impacts were characterized by subtle changes and adverse outcomes have also occurred.

This kind of involvements had been taken up in places where the economic development is the most advanced. Those areas have been demarcated and policies, interventions, technological solutions, awareness and engagement campaigns have been started. China's goals have been set in accordance with the Sustainable that China recently released. The **China Sustainable Development Indicator System** will annually rank the performance is a new sustainability indicator framework and annual ranking of the sustainability performance of Chinese cities.

Agriculture review: China and Small Landholders

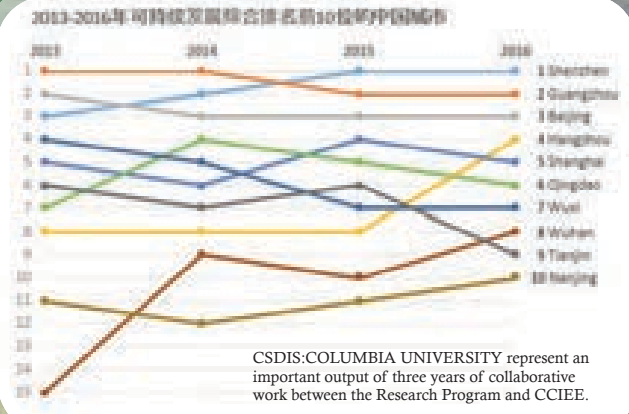
As we Review China's agriculture, it is characterized by a large number of small landholders and is known as the smallholder economy. Unlike other countries, due to China's land policies, the farms are homogenously small. Small farms lead to inefficient use of agricultural chemicals.

They dominate in China, largely due to regulatory barriers by the Hukou System (household registration system) and limits on the transfer of cropland use rights. *Fei-Ling Wang, Ph.D. (University of Pennsylvania), is a professor at Sam Nunn School of International Affairs, Georgia Institute of Technology says "in* China however, the *hukou* system is used to actively limit
a person to decide as to where to stay. China restricts the rural hukou to change to a more attractive residence or to a urban hukou. In this way this system institutionalizes inequality and consolidates the government's administrative control over China's population". It is on these small farmers that the food security of the nation depends.

Sustainability Trial: Smallholder farmings

Let us have an analysis of one of the Sustainability Trial which got published in the journal, Nature. A collaboration of scientists from the University of Pennsylvania , USA and Agriculture professionals in China have described how evidence based techniques were passed on to make smallholder farming in the country more efficient. The project carried out from 2005-15, was able to reach 20.9 million farmers across 452 territories in the country covering an area of about 37.7 million hectares.

The project was carried out in two stages. Stage one was technological wherein field trials across major agro ecological zones were conducted. Cropping strategies for a particular region were developed based on soil type, weather patterns and availability



CSDIS:COLUMBIA UNIVERSITY represent an important output of three years of collaborative work between the Research Program and CCIEE.

of local resources. It was assessed how factors like irrigation, plant density and sowing depth affected productivity.

Second stage involved transferring this trial and tested knowledge to the farmers. This involved a collaborative network of 1152 researchers with extension agents and agribusiness personnel. The researchers, who developed the models, trained the extension agents and agri-business personnel, who in turn trained the farmers on the field which led to the application of scientific agricultural principles on the farms in China.

The results were appreciable .Average yield of maize, rice and wheat increased about 10.8% – 11.5% and at the same time application of nitrogen base fertilizers decreased by 14.7% - 18.1%. With the implementation of the policy, greenhouse emissions substantially dropped. Prior to the intervention, the emissions of CO2 per Megagram (Mg) of maize, rice and wheat produced were 422 kg, 941 kg, 549 kg which reduced to 328kg, 812 kg and 434kg of CO2 respectively.

There was an appreciable increase in the grain output and decrease in the usage of nitrogen as fertilizer and it was found to be equivalent to US$12.2 billion. The Monetary wasn't the only thing that was in mind but at the same time adopting better and sustainable farming practices. It was a multidimensional approach, among scientists, extension agents, agribusinesses, and farmers.

Lessons to be learnt

The project in China has brought forward various lessons for the global agricultural community.It suggests that a scientific approach can increase agricultural productivity reducing the damage to environment. Another noted lesson is the power of networks. A collaborative network of 1200 scientists, 6500 officials, 140000 industry experts with 21 million farmers allowed for transfer of information.

The scientific plan adopted could be replicated in various other countries. Since the central control and regional infrastructure in China are suitable for a large-scale policy implementation, but in some others it wouldn't be possible, but its definitely worth try. The program should be continuously monitored and updated with alterations specific to farmer problems and climate changes. The methods adopted in China also could be replicated elsewhere. The greatest barrier to sustainable agriculture is getting farmers to adopt practices that are more efficient.

History: Sustainability

In the book "Farmers of Forty Centuries," the agronomist F.H. King lists many successful cases of Chinese traditional farming. The practice of 'Agriculture without waste,' without using any external inputs was the key to the 4000 years of fertile land in China. Community supported Agricultural enterprises have been flourishing in China. A report by International Institute for Environment and Development, analyzed several case studies of the sustainable agricultural practices of various provinces in China evaluating sustainability in all its social, economic and environmental dimensions.

As seen from the above studies, it is seen that the Collective Organization is the key to viability of sustainable agriculture as the cases highlighted a number of factors making collective support essential to farmer's income and deriving profits. They also showed that external actors and local governments could be catalytic for promoting sustainable pathways. Be it be professors, scientists or local NGOs, with more access to information and commitment to preserving environment, their roles must be diverse as introducing new concepts, facilitating information sharing and building bridges between policy makers and farmers.

Sustainability, a way forward

Ensuring Sustainability is to create ensuring Awareness of the same. Awareness in the minds of farmers, consumers, policy makers as well as implementers. *Richard Brubaker the founder of Collective Responsibility explains the* sustainability issues China is facing to be tied to economic development. The next 25-50 years will be crucial. The Chinese people will be continuously working on problems such as health and safety and it will be a process that is largely driven by an approach that evaluates theories or beliefs in terms of the success of their practical application and will develop a harmonious society.

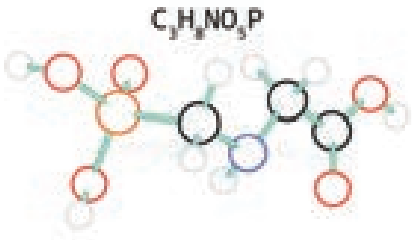
References

1. Norse, D.; Ju, X. Environmental costs of China's food security. Agric. Ecosyst. Environ. **2015**, 209, 5–14.
2. https://thediplomat.com/2017/07/chinas-hukou-system/
3. China's response to a national land-system sustainability emergency Published: 11 July 2018, Nature
4. https://www.theguardian.com/sustainable-business/blog/china-sustainability-economy-environment-ecology
5. Sustainability Measurement in China: Fostering a Race to the Top by Kelsie Defranca, State of the Planet, Jan 23,2018
6. https://blogs.ei.columbia.edu/2018/01/23/sustainability-measurement-china-fostering-race-top/
7. http://theconversation.com/what-we-can-learn-from-chinas-fight-against-environmental-ruin-99681
8. https://www.sheffield.ac.uk/global/china/news-features/towards-sustainable-farming-model-biotechnology-asia-weekly-1.538763

Glyphosate
A slow moving horror

Tony Mitra

Agriculture World interviewed **Mr Tony Mitra,** a food security activist and an independent researcher based in Canada, regarding the safety and use of herbicide glyphosate and glyphosate based formulations.



The safety and use of the popular herbicide Glyphosate and Glyphosate-based formulations the active ingredient in Monsanto's Roundup, are been discussed globally and is still a controversial topic. Many countries around the world have taken the lead in banning glyphosate, the recent ban being in the small state of Kerala, India. France has promised to take all immediate measures to ban the product as soon as possible and the phasing out strategies has already started.

Over the last 40 years, there wouldn't have been a molecule researched so far and that have been extensively evaluated for human health and safety. Independent researchers have conducted most of the scientific research on glyphosate.Recent report brings needed attention to the dangers of early-pregnancy pesticide exposure, and underlines the need to take a precautionary approach to the introduction of biocides in our environment so that future generations do not suffer from mistakes of the past. Lawmakers and regulators need to consider taking a more precautionary approach and seek independent and unbiased and vigorous investigation on the safety of molecules such as Glyphosate and its effect on soil biology, ecology and health.

In this context, Agriculture World also had a recent talk with Mr Tony Mitra, an engineer, a food security activist and an Independent Researcher based in Canada.It was interesting to know about his single-handed campaign to get the Canadian Government to test many samples of locally grown and imported foods, to detect the presence and level of contamination of Glyphosate. Subsequently Canada becoming the first and so far the only country to have conducted such thorough tests, and Mr Tony Mitra became the only common man outside of the Canadian government to have access to the test results. The analysis of these results proved North America to be producing the most toxic foods on earth containing glyphosate. The results were analyzed, categorized, tabled and put into charts. These have been published in a 400 plus page book available through Amazon under the title 'POISON FOODS OF NORTH AMERICA". It is the only study of its kind to give details of the toxic residues of glyphosate in various foods from different countries.

This analysis also exposed the case of highly toxic lentils being imported into India from Canada, concerns over rapidly rising ill health vaguely linked with modern lifestyle, but strongly suspected by many to have a direct link with exposure to agricultural toxins in general, which has encroached into the agriculture of India, often through the backdoor. Discussions with him

NORTH AMERICA, INDIA & CHINA			
GLYPHOSATE IN FOOD TYPES			
FOOD TYPE	North America	INDIA	CHINA
Flour - Bean	1067	0	0
Flour - Chickpea	970	12	
Flour - Soy	718	0	
Chickpea Products	426	2	
Chickpea	555	18	
Bean - Kidney	358		0
Lentil	357	295	
Lentil Products	272	11	
Flour - Pea	210	188	
Bean - Pinto	128		102
Millet	127	0	0
Bean - Other	136	5	3
Pea	117	171	0
Buckwheat Products	67	0	0
Millet Products	54	0	0
Infant Food (non-cereal)	32	0	0
Grain - Rice	5	1	0
POISON FOODS OF NORTH AMERICA			

were a revelation to a few facts, which was quite unknown.

The Book reveals studies, which show that USA and Canada produce the most toxic foods on the planet, with regard to glyphosate contamination and Canada, particularly West region have significantly higher levels of glyphosate. Cleanest of food suppliers are Peru, Thailand, France, South Africa, Mexico, and China. China apparently exports cleaner foods than what locals consume inside China. For example, imported foods from China, averaging 3 ppb contamination, is 28 times cleaner than foods produced in the US, and over 45 times cleaner than foods produced in Canada. Foods imported from Mexico are 70 times cleaner than Canadian foods and over 40 times cleaner than foods originating in the United States.

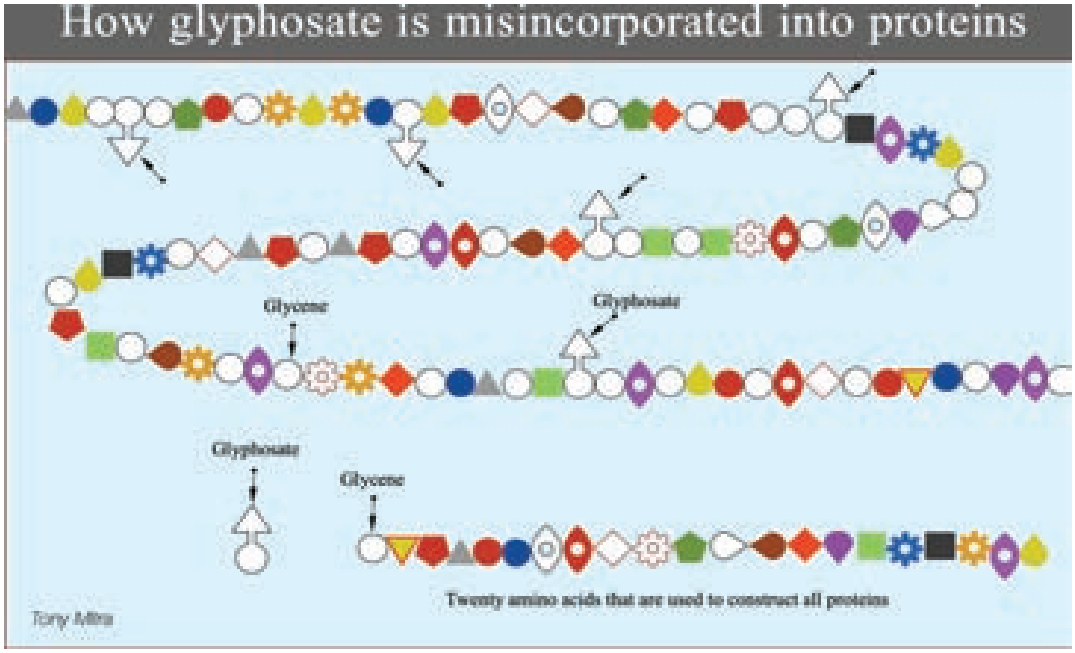
Conventional foods desiccated by glyphosate are far more contaminated with glyphosate than roundup ready GM crops. Out of the main cereals, rice is about the only one that is more or less without any glyphosate, except for some rice and rice-products produced in North America. Lentils and chickpea (garbanzo) produced in North America, as well as foods made with these ingredients are highly contaminated with glyphosate. Although soy flour may contain high glyphosate, tofu made out of soy has none. Wheat bran produced in Canada has an average of around 2,500 ppb of glyphosate in every sample. Organic foods are much better than conventional foods, but are not completely free of glyphosate. Gluten free foods are a mixed bag since some of them are high on glyphosate content, while others are clean.

Mr Tony Mitra in his book explains that he has been personally struggling with the Canadian Government for a number of years now he says, trying to get its ministry of health to release to him all documents on Glyphosate it has received that are supposed to prove its safety in food.

In 2015, the International Agency for Research on Cancer labelled glyphosate as "probable carcinogen". Nations such as Sri Lanka banned glyphosate because they have reason to suspect farm workers exposed to glyphosate were dying from kidney failure or throat cancer. The American Association for the Advancement of Science (AAAS) has awarded two researchers for uncovering the link between glyphosate and chronic kidney disease (CKD), which has killed at least 25,000 Sri Lankans and 20,000 Central Americans. Award recipients are Sarath Guanatilake, MD, and Channa Jayasumana,

GLYPHOSATE IN FOODS FROM NORTH AMERICA, INDIA & CHINA			
REGION	NOS	% Dirty	ppb
North America	4214	44	108
India	200	20	15
China	145	14	3

Table represents foods from India and China that are imported into Canada, and not foods consumed by locals in those countries.



PhD. "To right a wrong when significant financial interests are at stake and the power imbalance between industry and individual is at play takes the unique combination of scientific rigor, professional persistence and acceptance of personal risk demonstrated by the two scientists recognized by this year's award," says Jessica Wyndham, director of the Scientific Responsibility, Human Rights and Law Program at AAAS. Under this situation of extreme intimidation, coercion and hegemony, it is impossible to consider what remains as honest scientific evidence when it comes to glyphosate.

As long as safety data based on which glyphosate was approved for use in agriculture is kept out of reach of the public, and as long as independent verification of the results is denied, there is no proof that glyphosate is safe at any level of contamination. Independent labs, institutions or universities should be encouraged to crosscheck these tests to ensure the results and the deductions are honest. Approval of glyphosate is constitutionally illegal if the public is denied access to such safety data and document. Jurisprudence already exists in India in the Supreme Court case between Ms. Aruna Rodrigues and the Union of India involving GMO and represented by esteemed lawyer Mr. Prashant Bhushan.

"There is a possibility that high levels of herbicide "glyphosate" in lentils imported from Canada and Australia, are impacting the health of the consumer says FSSAI in their recently published circular. The lentils such as masoor dal and moong dal are said to be induced with hazardous herbicide Glyphosate which is being used by farmers in some countries to desiccate, or kill the crop prior to harvesting.

MRL in food has been repeatedly raised to legitimize with rising levels of pesticide without supporting proof. Since India has not approved use of glyphosate in food, and consequently not set any MRL inpulses, FSSAI regulators has been coaxed to change its position of "no glyphosate allowed", to the high glyphosate MRLs set by Codex Alimentarius. FSSAI reports that MRL (as specified in Codex) will also be taken into consideration for the purpose of import clearance. The FSSAI action came after it was warned by Mr. Mitra that Australian moong dal and Canadian masoor dal contained high residues of Glyphosate.

Glyphosate- A chelator

Glyphosate is a chelator which means it has a strong attraction to metallic ions, what we often call minerals, or nutrients. Our food contains small quantities of such minerals such as iron or manganese, etc. All animals including us humans need small quantities of such minerals and are usually picked up from our food through the digestive system, often assisted by our gut bacteria colony or microbiome. However, if glyphosate is present, it captures these minerals, and makes these nutrients unavailable to us. Thus, we starve of nutrition even if the food we eat are nutritious.

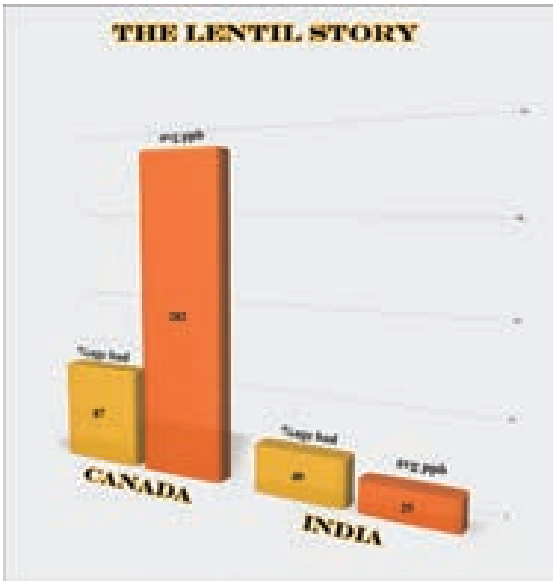
Endocrine disruptor

Glyphosate is known to disrupt the endocrine or hormone system. The effects of glyphosate interfering with endocrine system as well as specific enzymes have been studied by independent scientists such as Antony Samsel and Stephanie Seneff. Glyphosate can kill off our microbiome faster than they can reproduce and make up. A person living with damaged and dying gut bacteria colony is like being condemned to slow poisoning

Glyphosate can seriously interfere with construction of proteins

All proteins of the living planet are constructed of twenty specific amino acids. Out of the twenty amino acids, glycine is the most common and frequently used**.** Glyphosate is an analog of glycine. This means it is structurally similar to glycine, with a small protrusion of extra material. It can fit into proteins in place of glycine. Our body, unfortunately, is unable to distinguish glycine from glyphosate.

Therefore, when a new protein is to be created to replace an old one, or to create fresh molecules for a growing body such as a fetus or a child, our body can and does wrongly pick up a glyphosate molecule, if it is around, instead of selecting a glycine, and use it in constructing a protein. Thus, glyphosate is suspected to be getting mis-incorporated into proteins, which in effect becomes defective proteins.



Thus these proteins malfunction, and can trigger a cascading series of diseases, many of which were earlier rare or unheard of. This is perhaps the most dangerous aspect of glyphosate being present in our food.

Scientists Anthony Samsel and Stephanie Seneff have studied the effects of glyphosateon living biology and have published a series of papers on scientific journals, linked below. Crops such as lentils, chickpeas, beans, wheat and other cereals are now directly filled with glyphosate spray just before harvesting. This process is called desiccation. This results in skyrocketing the concentration of glyphosate in these seed crops.

India also has the highest and still rising rates in the world of various medical problems relating to birth defects such as Neural Tube Defect, Spina Bifida, and a runaway increase of many other disease from diabetes to autism and auto-immune disease that are spread across the urban and the rural community.

Unless the toxic overload is restricted, India faces the real prospect of a systemic and simultaneous collapse of its healthcare as well as agriculture system in the near future. India needs to get its priorities right. Clean food, water, air, good health and food sovereignty are inalienable rights of the people, and not commodities to make profit on at the expense of public health.

Reference

1. **Poison Foods of North America**: Tony Mitra
2. **Anthony Samsel and Stephanie Seneff on Glyphosate**
3. **Poison Spring**

FOR THE BENEFIT OF FARMERS,

KRISHI JAGRAN *WORLD'S LARGEST CIRCULATED*

GLOBAL

M.C. Dominic	+91-9654 193 353	dominic@krishijagran.com
Shiny Dominic	+91-7838 776 057	shiny@krishijagran.com
M.G. Vasan	+91-9313 301 029	sanjay@krishijagran.com
D.D. Nair	+91-7903 729 9830	ddnair@krishijagran.com
Gavrilova Maria	+91-7927 305 8626	maria@krishijagran.com
Chris Mccullough	+44-(0) 7732 486481	chris@krishijagran.com
Gargi Arya	+49-176 34593163	gargi@krishijagran.com
Sourojit Das	+353 894457057	sourojit@krishijagran.com

ALL INDIA EDITORIAL - editor@krishijagran.com

K.T. Chandy	+91-8543 005 209	ktchandy@krishijagran.com
Chander Mohan	+91-9891 334 429	cmohan@krishijagran.com
Shanmugam	+91-9962 980 412	shanmugam@krishijagran.com
Dr. Sangeeta Soi	+91-9891 123 722	sangeeta@krishijagran.com
Dr. Mahendra Pal	+91-9426 085 328	mahendra@krishijagran.com
Suresh Muthukulam	+91-9999 761 563	suresh@krishijagran.com
Tanmoy Karmakar	+91-9999 796 137	tanmay@krishijagran.com
Malur Vijee	+91-9999 796 334	malurvijee@krishijagran.com
Balaswamy	+91-9182 674 010	balaswamy@krishijagran.com
Karthika	+91-9999 761 303	karthika@krishijagran.com
Sandip Kumar	+91-9891 667 686	sandip@krishijagran.com
Pradeepta Dutta	+91-9999 796 859	pradeepta@krishijagran.com
Abha Anjali T.	+91-9313 301 029	abha@krishijagran.com
Tooba Maher	+91-9999 843 592	tooba@krishijagran.com
Lakshmi Unnithan	+91 9891 899 064	drlakshmi@krishijagran.com

SOCIAL MEDIA-

Imran Khan	+91-9582 957 538	imran@krishijagran.com
Aniket Sinha	+91-9313 301 029	aniket@krishijagran.com
Sreeja S. Nair	+91-9999 761 903	sreeja@krishijagran.com
Rohitash	+91-9999 154 861	rohitash@krishijagran.com
Girish Pandey	+91-9999 346 636	girish@krishijagran.com
Manisha Sharma	+91-9999 154 802	manisha@krishijagran.com
Prabhakar Mishra	+91-9999 154 803	prabhakar@krishijagran.com
Kishan Agarwal	+91-9999 646 226	kishan@krishijagran.com
Vivek Rai	+91-9582 957 538	vivek@krishijagran.com

MARKETING - advt@krishijagran.com

Sanjay Kumar	+91-9313 301 029	sanjay@krishijagran.com
Ratna M. Sharan	+91-9891 956 956	ratna@krishijagran.com
Farha Khan	+91-9891 724 495	farha@krishijagran.com
Harsh Kapoor	+91-9891 724 466	harsh@krishijagran.com
K.J. Saranya	+91-9811 758 683	saranya@krishijagran.com

PRE-PRESS- prepress@krishijagran.com

Yogesh Kumar	+91-9891 668 636	yogesh@krishijagran.com
Atul Batham	+91-9891 006 635	atul@krishijagran.com
Nasim Ansari	+91-9891 886 622	nasim@krishijagran.com

Video Team

Nishant Taak	+91-9953 756 433	nishant@krishijagran.com
Jimmy	+91-9999 142 633	jimmy@krishijagran.com
SK Ibrej Alam	+91-9891 511 144	skibrej@krishijagran.com
Vivek Chand	+91-9891 660 044	vivekchand@krishijagran.com
Faizan Ali	+91-9999 743 660	faizan@krishijagran.com

CIRCULATION- circulation@krishijagran.com

Abdus Samad	+91-9891 889 588	samad@krishijagran.com
Rahul Singh	+91-9891 339 440	rahul@krishijagran.com
Prashant Sharma	+91-9891 263 263	prashant@krishijagran.com
Pawan Kumar	+91-9891 311 166	pawan@krishijagran.com
Pappu Ray	+91-8447 527 367	pappu@krishijagran.com
Furkan Qureshi	+91-9891 223 340	furkan@krishijagran.com
Sujit Pal	+91-9891 899 197	sujit@krishijagran.com
Tarun Thakur	+91-9891 883 231	tarun@krishijagran.com

LEGAL OFFICERS

James P. Thomas	+011-2651 1848	info@krishijagran.com
H. ASUMUDDIN	+011-2651 7923	info@krishijagran.com

ACCOUNTS- accounts@krishijagran.com

Lakshmi Ratheesh	+91-9999 796 236	lakshmi@krishijagran.com

Associates

A.Vijayan	+0474-2760868	- Kollam **(Kerala)**
N.Remanan	+91-9995177893	- Kollam **(Kerala)**
S.Santhosh	+91-9447161310	- Kollam **(Kerala)**
Joseph Jimson	+91-7403040200	- Kollam **(Kerala)**

Associates

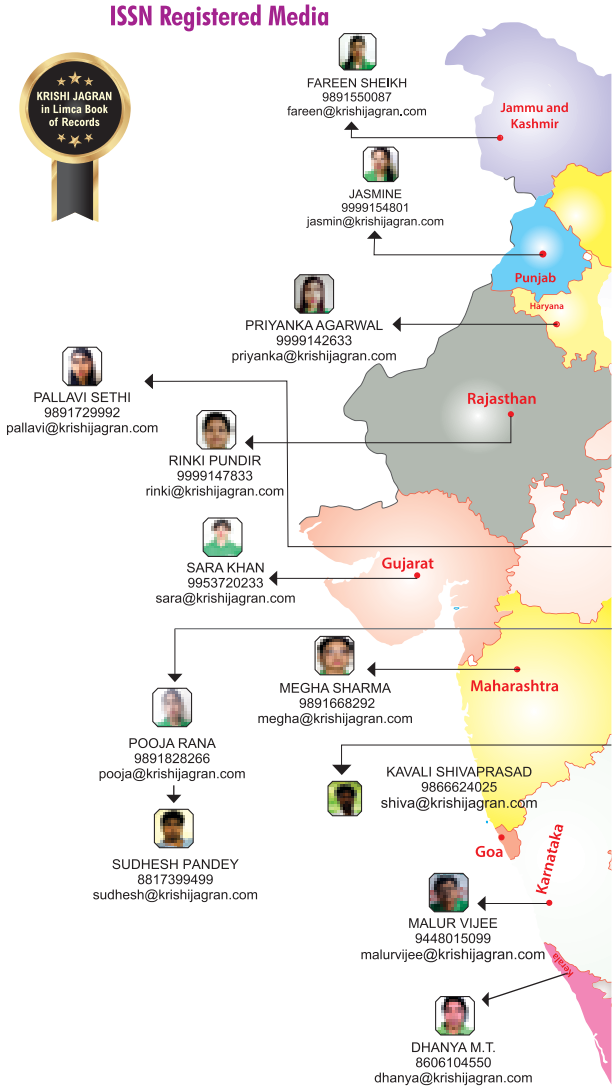
Milind Kadam	+91-9891614614	- Pune **(Maharashtra)**

A Limca Book of Records Holder

ISO 9001, 14001 & 18001 Certified Company

ISSN Registered Media

KRISHI JAGRAN in Limca Book of Records



Associates -North India

Gaurav Saxena	+91-9219 270 792	- Pilibhit **(U.P.)**
Rupnarayan	+91-9303 098 039	- Janjgir–Champa **(CG)**
Mukesh	+91-8059 781 891	- Bhiwani **(HR)**
Vishnu Sakat	+91-8120 654 631	- Mungeli **(CG)**
Pramod Kumar	+91-9936 778 899	- Allahabad **(U.P.)**
Abhilash K. Katakwar	+91-9691 886 983	- Janjgir–Champa **(CG)**
Mahendra Sahu	+91-8223 985 519	- Dhamtari **(CG)**
Lomesh K. Saket	+91-8223 940 035	- Mungeli **(CG)**
Ashok K. Malavo	+91-7665 024 686	- Baran **(RJ)**
Pravin K. Dixit	+91-9651 511 474	- Sitapur **(U.P.)**
Mukesh Sahu	+91-9753 003 609	- Dhamtari **(CG)**
Satyam Mishra	+91-9935 321 897	- Dhamtari **(DL)**
Raj Bharti	+91-9634933156	- Pilibhit **(U.P.)**

info@krishijagran.com, editor@krishijagran.com, advt@krishijagran.com

HEAD OFFICE: 60/9, 3rd Floor, Yusuf Sarai Market
Near Green Park, Metro Station, New Delhi-110016
Mob. 9313301029 I Email: info@krishijagran.com
www.krishijagran.com

Keral: Kumara Vilas, TC-29/1902, Elankom Gardens, Vellayambalam, Sasthamangalam P. O, Trivandrum
Phone 0417-4059009
Email: malayalam@krishijagran.com

Karnataka: 1st Floor, 33/3, B M Mansion, Geddalahalli, Sanjay Nagar, Main Road, RMV second stage, Bangalore -560094, Mob. 9448015099
Email: kannada@krishijagran.com

West Bengal: 3rd Floor, 19, N.S. Road, Kolkata - 700001
Mob. 9674853530
Email: bengali@krishijagran.com

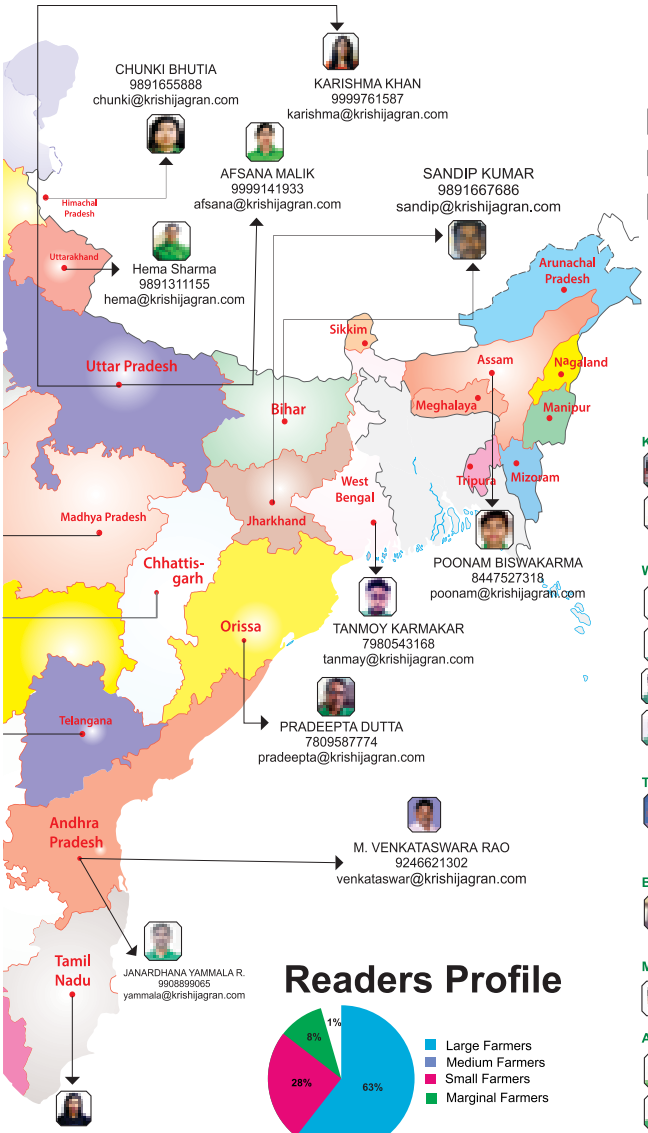
Bihar: Kesri Sadan, 4th Floor, Near Bank of India, Jamal Road, Patna-800001, Mob. 9891667686
Email: hindi@krishijagran.com

REACHING WORLDWIDE

MULTILINGUAL AGRI-RURAL MAGAZINE

AGRICULTURE WORLD

To Reach Rural India-Advertise in **KRISHI JAGRAN** and Go Global through **AGRICULTURE WORLD** & KJ Portals



Readers Profile

Associates -West Bengal

Shekhar Roy	+91-6294593656	- Coochbehar
Ashok Khetawat	+91-9434966675	- Uttar Dinajpur
Debasis Pal	+91-9832457102	- Jalpaiguri
Ismail Saikh	+91-8972857004	- Murshidabad
Jyotiram Roy	+91-9126888991	-Jalpaiguri
Khokon Barman	+91-8509264886	- Coochbehar
Uttam Chaudhary	+91-8637379164	- Alipurduar
Ranjit Roy	+91-8670503682	- Jalpaiguri
Nanigopal Roy	+91-9635711675	- Jalpaiguri
Gadadhar Adhikari	+91-8945973456	- West Midnapur
Debobroto Ganguly	+91-9093078243	- Nadia
Nanigopal R.	+91-8172098649	- Jalpaiguri

Regional Offices

Kerala

Suresh M.	+91-9999 761 563	suresh @krishijagran.com
Dhanya MT	+91-9999 761 521	dhanya@krishijagran.com
Saritha Reghu	+91-9999 761 308	saritha@krishijagran.com
Arun T	+91-9999 761 849	arun@krishijagran.com
K.B Bainda	+91-9999 761 406	kbbainda@krishijagran.com
Asha	+91-9999 761 416	ashas@krishijagran.comh
Saritha N.R.	+91-8606 388 668	sarithanr@krishijagran.com
Irfan Ebrahim Sait	+91-7403 377 786	irfan@krishijagran.com
Sreeja S Nair	+91-9999 761 903	sreeja@krishijagran.com
Karthika B.P	+91-9999 761 303	karthika@krishijagran.com
Bijimol V	+91-9999 761 567	bijimolv@krishijagran.com
Nasar Ponnad	+91-9999 761 746	nasar@krishijagran.com
S.Gopakumar	+91-9999 761 746	sgopa@krishijagran.com

Karnataka

Vijay Kumar	+91-9999 796 334	malurvijee@krishijagran.com
P S Geetha	+91-9999 796 158	pgeetha@krishijagran.com
Sowmya	+91-9999 796 730	sowmyasundar@krishijagran.com
Kiran	+91-9380 590 902	kiran@krishijagran.com

West Bengal

Runa Nath	+91-9999 796 215	runa@krishijagran.com
Amarjyoty Roy	+91-9999 013 045	amarjyoti@krishijagran.com
Tanmay Karnakar	+91-9999 796 137	tanmay@krishijagran.com
Abhishek C.	+91-9999 796 874	abhishek@krishijagran.com
Pradip Paul	+91-9891 899 322	pradip@krishijagran.com
Sushmita Kundu	+91-9999 796 731	sushmita@krishijagran.com
Pulak Kar	+91- 9999 796 831	pulak@krishijagran.com

Tamil Nadu

Shanmugam	+91-9962 980 412	shanmughom@krishijagran.com
Saranya KJ	+91-9811 758 683	saranya@krishijagran.com

Bihar

Sandip Kumar	+91-9891 667 686	sandip@krishijagran.com
Rakesh Kumar	+91-9801 972 152	rakesh@krishijagran.com

Maharashtra

Bibhishan Manikrao B.	+91-9891 729 800	bibhishan@krishijagran.com

Andhra Pradesh & Telangana

Shiva Prasad K.	+91-9866 624 025	kavali@krishijagran.com
Balaswamy	+91-9912 975 753	balaswamy@krishijagran.com
Raghu	+91-9999 796 229	raghu@krishijagran.com
Janardhana Y. Rao	+91-9908 899 065	yammala@krishijagran.com
M. Venkataswara Rao	+91-9246 621 302	venkataswar@krishijagran.com

Odisha

Pradeepta K. Dutta	+91-9999 796 859	pradeepta@krishijagran.com
Swati	+91-9999 796 367	swati@krishijagran.com

Assam

Nilima Changmai	+91-9999 796 813	nilima@krishijagran.com

Supporting

Rabindra Jana	+91-9891 334 425	rabindra@krishijagran.com
Devendra Singh	+91-9891 339 310	devendra@krishijagran.com
Jagdish Jana	+91-9999 141 933	jagdish@krishijagran.com
Manoj Kumar	+91-9891 886 680	manoj@krishijagran.com
Neeraj	+91 9891 886 680	neeraj@krishijagran.com

circulation@krishijagran.com, jobs@krishijagran.com

Telangana: No. 301, 3rd Floor, R.K Apartments
Barkatpura, Hyderabad -500027, Mob. 9866624025
Email: telugu@krishijagran.com

Tamil Nadu: Subadarasan's Tharanis Orchid, 654-E,
Central Studio, Trichy Road, Singanallur, Coimbatore -
641005, Tamil Nadu, Mob. +91 9811758683
Email: tamil@krishijagran.com

Odisha: KVK- Khordha (ICAR), Kausalyaganga
Bhubaneswar- 751002, Odisha, Mob. 9938103885
Email: odia@krishijagran.com

Assam: House No. 16, 2nd Floor Ambikagiri Nagar
(Near Lakhi Mandir) Guwahati, Assam 781021
Mob: 9101353580 Email : assamese@krishijagran.com

Maharashtra: C/o Athashri
Xion Flat No. 511, Near Big Bazaar, Hinjavadi Phase -1
Pune - 411057 MH
Mob: 9891729800, Email : marathi@krishijagran.com,
www.krishijagran.com.

C.D.Mayee
Former Chairman ASRB, New Delhi, President: South Asia Biotech Centre, New Delhi and Indian Society for Cotton Improvement, Mumbai

Supporting Farmers with Quality Crop Protection Products Challenges & Opportunities

Pesticide Industry needs the much-needed attention and is looking forward to reforms in the sector. It would be unwise for the government to not look at this sector seriously, as it is facing a crisis at the moment.

Indian Agriculture –Current Scenario

Indian Agriculture has travelled a long way from food shortages and imports to self-sufficiency, improved production systems surplus to exports. A vital sector of the national economy with 54.6 % of the population is engaged in agriculture and allied fields. India ranks 2nd in production in the world today and this could be attributed to a wide range of agro-eco conditions for diversified agricultural practices; largest irrigated area in the world rich agro-biodiversity, family managed small farms and their integrated mixed farming systems. In terms of total production in the world, we are first in total pulses, second in wheat, rice, sugarcane, tea, cotton (lint).vegetables and fruits. Horticulture production even has surpassed that of food grains for the sixth consecutive year in a row at 305.4 mt from only 25 million hectares land in 2017. The *Agricultural revolutions definitely* resulted in important socioeconomic changes in the country but *unfortunately* meet new challenges.

Indian Pesticides Market

India is the fourth largest global producer of pesticides with an estimated market size of around $4.9 billion in FY17 after United States, Japan and China. Some 60% of the products are supplied to the domestic market and 40% are exported to the international market. The agrochemical market in India is expected to reach USD 8.1 billion in 2025 at a compound annual growth rate of 8.6%. There are currently about 125 pesticide technical grade manufacturers, above 800 formulators, and 45,000 distributors in India. India has the largest area of 141m ha under cultivation of crops but accounts for only 1.7% of the global use of pesticides while European countries put together account for 11% of the global consumption. India's pesticides consumption is one of the lowest in the world, and it is well-established fact that on an average the country loses 25-32 % of agricultural produce due to the pests and diseases on farm and off farm. It amounts to more than INR 1,50,0000 crores by conservative estimates.

In India, pesticides are regulated under the Insecticides Act of 1968 and Insecticides Rules

of 1971. The Central Insecticides Board (cib) in Faridabad, Haryana, is the nodal regulatory body.

Pesticide Industry needs the much-needed attention and is looking forward to reforms in the sector. It would be unwise for the government to not look at this sector seriously, as it is facing a crisis at the moment. Pesticides are an essential tool in farming, but the most important part of the use is precise and proper dispensation to the target organism. This requires special efforts to educate the users and hence it becomes the prime responsibility of the producers, consumers, extension agencies and all the stakeholders to see how best the crop health is achieved by using the chemicals without disturbing the environment and human /animal health.

Genuine crop protection products undergo an indepth, extensive and strict regulatory evaluation before being placed on the market, all with the objective of offering safe and high quality products that contribute towards a sustainable agriculture. Research of new molecule costs more than 2000 crores and as on date very few molecules are in the pipeline. However, the growing number of counterfeits in the market is not only compromising sustainable agriculture but also posing an unacceptable risk to human health. Counterfeit and illegal pesticides in the current market are worth 3200 crores in 2015. These constitute almost a quarter of total pesticide market and are growing faster than the legitimate / officially approved pesticides.

Challenges

The future of Indian agriculture is a challenging one, with greater challenges in vogue this decade. Large numbers of local level manufactures are selling various products as Bio-Pesticides in the state of Andhra Pradesh, Karnataka, Gujarat, UP, Madhya Pradesh, Chhattisgarh, West Bengal and Bihar. The Bio-Pesticides seem to contain enzymes and gibberelins to create a perception of healthy growth coupled with pest control in the minds of the farmers.

Most of the manufactures of the so called Bio-pesticides have neither credible background nor research base to produce authentic bio-pesticides. 20 samples tested in NRC, Grapes, Pune where in 19 out of 20 samples were found containing various pesticides/cocktail of even 7 pesticides in one product. Wheat production is suffering badly because most of the weedicides developed resistance due to use of such chemical laced biopesticides as under dose. Similar is position of BPH in Paddy crop and many others.

Crop losses ultimately leading to farmers' distress, dangerous health hazards, resurgence of new pests and diseases and environment pollution. There is a current threat to even export of fruits, vegetables, and commodities with residues of spurious pesticides.

APEDA even found Profenophos, Abamectin and Flursilazole in export grapes as residue which was sprayed with a bio-product called Bio-Prahar. Analysis of fake bioproducts sold in the name of the Kalia-185, Boost, Prior 303, Corgmt, Larvinox etc were detected for the presence of Abamectin, Buprofezin, Chlorantrani liprole, Emamectin Benzoate and 4-bromo-2-chlorophenol.

Farmers will require deeper understanding of IPM and access to information and technical support, if food production is to be sustained at current levels. All this creates more problems for the genuine produces of these chemicals.

The indiscriminate use of the chemicals has inadvertently brought several side issues of pesticides in public discussion eclipsing their real advantages in pest management.

A. The pesticides residue issue Promotion of Good Agricultural Practices (GAP), needs to be followed. Success story of exports of residue-free table grapes from India is a reminder to all export oriented crops. A '**Residue Monitoring Programme**' was initiated in 2003 for grapes to be exported in collaboration with APEDA, Department of Horticulture, Government of Maharashtra, Farmers, Associations, Private Residue Labs with coordination from NRC Grapes. Diseases and pests couldn't be controlled without the use of pesticides, and so it became mandatory on the part of growers to get educated on the correct use, time and dosages of application of pesticides to see that that the produce is residue-free. The scheme involved registration of grape farmers, farm inspection by Agricultural Officers, and pesticide schedule of application as per scientific advice and analysis for residue in time before export. Nearly 100-pesticide list is available for residue analysis as per harmonized EU MRL and such material once exported is easily accepted in Europe. If the residue was detected internal alerts were given in advance to check further sprays.

The national referral laboratory established in NRC Grapes developed unique multi-residue analysis that is cheaper and convenient. Proactive, time-bound and strategic implementation of Residue Monitoring Plan of APEDA has added value to grape produce and there have been no rapid alerts or rejection of consignments of exports grapes from Europe. The grapes were exported mainly to Holland, UK, Bangladesh, UAE and Germany. Since the operation of the scheme in 2003, export quantity of fresh grapes increased by 3.2 times in last five years, the financial returns increased by 2.5 times. This is a unique pre-harvest sampling method established for residue testing of grapes; first of its kind in the world. The scheme is being extended to other fruit crops like mango, pomegranate, oranges, vegetables and giving guidance for export of residue-free fish products. So, excellent opportunities exist to tackle the issue of pesticide residues.

B. Resistance and Resurgence Management

Excessive and indiscriminate use of pesticides has led to problems of insecticide resistance and pest resurgence. The well studied case of pyrethroid use in cotton is an example as the how the minor sucking pest became major and how the best product has lost its ability to kill the pest because of development of resistance in boll worm. Resistance to insecticides reduces the effective window for insecticides to achieve economic control of American bollworms. Hence, the choice of insecticides is imperative, if pest control is to succeed. An exhaustive study of IRM has been carried out by CICR, Nagpur with lot of International and National support. For the first time, the IRM program of `WINDOW APPROACH' was taken for technology transfer to 260 villages by Government of India at an annual cost of Rs. 20 million. At this scale no IRM program has been sponsored anywhere in the world. The IRM strategies of opening and closing of windows for specific chemicals aims at slowing down the resistance treadmill, thereby extending usefulness of available chemicals. The approach has been very successful in maintaining the efficacy of this important chemical for controlling the pink bollworms. The window of pyrethroid allowed to be opened only after 120 days of crop duration has succeeded on several counts; slowing down of resistance of useful chemical, ceasing the resurgence of white flies and other sucking pests, allowing the natural parasitization and predation of sucking pests attacking cotton in early stages and better economic returns to growers.

C. Integrated Pest Management

The classical approach that the protection scientists have devised is Integrated Pest Management. IPM emphasizes the growth of a healthy crop with the least possible disruption to agro-ecosystems and encourages natural pest control mechanisms. IPM is careful consideration of all methods including. IPM checks that the levels that are economically justified and also minimize risks to human health and the environment.

Several modules of IPM have been developed and packages for all-important crops are developed through Department of Plant Protection, Quarantine and Storage. However, the modules need location-specific validation of large scale. The classical use of IPM in recent years has been in cotton and rice. It has already shown that indiscriminate use of pesticides could be arrested by adoption location-specific IPM modules in the country. The amount of efforts done in this direction through Government, public and privates partners is commendable. For example, the successful demonstrations of IPM in village Ashta (Maharashtra) on cotton have a great impact on its spread. Similarly, the supportive program of FAO through FFS (Farmers Field Schools) in training the people have given the requisite fillip to this programme.

D. Counterfeit Pesticide

The greatest damage to pesticide industry and the pesticide public perception is done by free marketing of spurious, untested, unregistered, duplicate pesticide chemicals. In fact, it has already reached a monstrous proportion. There are means to stop this menace through proper regulations and implementation of the current rules with sincerity. The author himself has tested 20 bioproducts sold in different markets of India and found that each one of them contained one or more newer insecticides. Many of them do not have proper labels and sold by unscrupulous dealers.

E. Role of Extension Services

Promoting the proper use of pesticides and stopping the use of unregistered products could only be brought about by mass awareness and campaigns. This needs to be done by State Governments too in collaboration with the standard pesticide companies. Several pesticide companies have established extension services along with research. However, since companies would promote their own products, the credibility of these services is often questioned. If these services are put into PPP-mode, they will have credibility. Recently, MANAGE (National Institute of Agricultural Extension Management) Hyderabad has developed a training program for agri-input dealers. This training should be in a partnership mode where all the pesticide dealers can be trained as they are the proper link between inputs and farmers. Such training through Agricultural Universities will be real benefit for correct use of pesticides and stopping the menace of spurious ones.

F. Surveillance and Forewarning

Insulation of agriculture through crop protection is possible only when we are in a position to forecast, predict the outbreaks. History is replete with examples as to what happens once a pandemic sets in. In India, we have experienced Bengal Famine which is partly attributed to epidemic of brown spot of rice. Epidemics of downy mildew of pearl millet, wheat rusts, apple scab, bollworms of cotton, whitefly pests, sunflower blight, mustard foliar diseases etc. remind us of the potential damage that pests and diseases can cause. Forecasting the outbreak is one way of precision pesticide use and reducing the crop damage. In India, a system of forecasting for only a few pests and diseases has been developed. Modern tools are now being

applied to this field. Department of Agriculture and Cooperation along with National Centre on IPM (NCIPM) and National Informatics Centre (NIC) have initiated a National Pest Surveillance Project recently. Similarly, NCIPM has developed systems to store, retrieve and generate reports of pest monitoring data collected through on line. With ICT, this area can progress much faster and for major problems, it will be possible to develop expert system based on forecasted information plus knowledge of expert for decision making on management of pest.

Key Recommendations

Proper Implementation of the Insecticide Act, 1968 needs to be done. Clarity in interpretations of various provisions of the insecticides Act 1968 needs to be done. The Proposed Pesticide Management Bill, 2017, will replace existing Act. Transparency into relooking the provisions of very harsh penalties to fake manufacturers should be done. Definition of misbranded and substandard requires reconsideration so as to bring graded distinction between the two. Proposed PMB seeks to make the Registration Committee a ten member body as against five member body existing under the present act. New Registration Certificates may be issued t the applicants having necessary infrastructure for manufacturing. New Registrations should be granted within a year of application.

Task force should be constituted to check the illegal products, standardizing the sampling procedures and improve working on quality laboratories needs to be done. State coordination should be enhanced and the well-known industry players in field and Government at Centre and State should come together in a PPP mode and prepare a road map to promote correct use of pesticide and stop the menace of spurious ones. The situation is grave and seriously needs to be addresses collectively by farmer associations, industry players, government and pesticide regulatory bodies in a time bound manner to curb further proliferation.

Prestigious "Agri Business Summit and Agri Awards 2019"

AGRI AWARDS

Country's most authoritative Awards for the sector is a platform to provide immense business & networking opportunities and brand positioning.

Awardees chosen are through a rigorous process, with on line nominations and picked up by India's best agri experts, who have themselves made a difference in agri sector.

Summit shall host high profile, decision makers and influencers, Government, Universities, Celebrities, bureaucrats will grace the occasion.

Summit is expecting over 300 senior level executives from about 75 companies.

Pre and post event is extensively covered by social, digital, electronic and print media.

Registrations now open for the prestigious "Agri Business Summit & Agri Awards 2019" on agriawards.in

This is the first of its kind happening in India to recognize agri input industry's efforts in increasing farm productivity.

RAY Consulting

agriawards.in | rayconsulting.in

Summit Date: 27th of April, 2019
at Hotel Park Hyatt, Hyderabad

Summit is conceived and designed by RAY Consulting

STATEMENT OF OWNERSHIP FORM IV

1. Place of Publication :
   Address : 60/9, 3rd Floor, Yusuf Sarai Market,
   Near Green Park Metro Station,
   New Delhi-110016
2. Periodicity : Monthly
3. Printer's Name : M C Dominic
   Citizen of India : Yes
   Address : E-20, Green Park Extn. New Delhi-110016
4. Publishers Name :
   M C Dominic
   Citizen of India : Yes
   Address : E-20, Green Park Extn.
   New Delhi-110016
5. Editor Name :
   M C Dominic
   Citizen of India : Yes
   Address : E-20, Green Park Extn.
   New Delhi-110016
6. Name & Address of Owner :
   M C Dominic
   Citizen of India : Yes
   Address : E-20, Green Park Extn.
   New Delhi-110016

I, M C Dominic, hereby declare that the particulars given above are true of the best of my knowledge and belief

Sd/-M C Dominic
Signature of Publisher
Dated : 1st March 2019

Important E-mail IDs of Krishi Jagran

Content Contribution
editor@krishijagran.com
English
english@krishijagran.com
Hindi
hindi@krishijagran.com
Gujarati
gujarati@krishijagran.com
Punjabi
punjabi@krishijagran.com
Marathi
marathi@krishijagran.com
Kannada
kannada@krishijagran.com
Tamil
tamil@krishijagran.com
Malayalam
malayalam@krishijagran.com
Telugu
telugu@krishijagran.com
Bengali
bengali@krishijagran.com
Assamese
assamese@krishijagran.com
Odia
odia@krishijagran.com
Advertisement
advt@krishijagran.com
Suggestions
feedback@krishijagran.com
Subscriptions
circulation@krishijagran.com
Conferences & Exhibitions
events@krishijagran.com
Prepress
prepress@krishijagran.com

Events

Round Table Conference on Supporting Farmers with Quality Crop Protection Products Challenges & Opportunities

Federation of Indian Chambers of Commerce and Industry (FICCI) in association with Crop Life India and ACFI organised the Round table conference on "Supporting Farmers with Quality Crop Protection Products: Challenges & Opportunities" at the Le Meridien Hotel on Feb 15, 2019.

Dr Ashok Dalwai, CEO, National Rainfed Area Authority, who inaugurated the conference pointed out the issues such as CIB's becoming more transparent, greater coordination between departments, sensitization at State level, creating more network and infrastructure to mitigate the problems the farmers are facing right now. Manually relying on these problems was seemingly difficult and he emphasized the need to depend on technology smart solutions. Dr Dikshit's book on Public Awareness about Safety and Protocols of Pesticides were also released during this function.

Various technical sessions on topics such as 'Role of Technology in Ensuring Qualitative Crop Protection Products' and 'Ensuring a Strong Enforcement Environment to Address the Issue of Quality of Crop Protection Chemicals' were also discussed during the conference. Stress was given to ensuring Quality Crop Protection products to farmers, as it becomes the government's responsibility as agriculture employees nearly half of India's workforce and contributes approximately 17% of the nation's GDP.

Senior officials from government and non-government sector, representatives from the agrochemical industries, academicians, technocrats, corporates, policymakers, farmers, media, scientists and students of various Agriculture Universities also attended the conference.

19th Edition of BioAg WorldCongress

The 19th edition of BioAg World Congress, an annual gathering of international BioAg industry leaders and experts, organized by Global BioAg Linkages, held on Feb. 18th to 20th in Delhi. Connecting, collaborating and forming partnerships were the key focus of BioAg Congress and it also discussed a detailed analysis of the trends and prospects about the future of Biologicals.

The Bio Ag industry is the fastest growing agri input segment but still innovation is much localized, while population growth pressure is widespread. Biologicals are becoming a must for IPM and ICM and play a crucial role when it comes to sustainable Agriculture. Launching of BASAI,
the Biological Agri Solutions Association of India was one of the major attractions of this 19th edition. Salil Singhal, Chairman and Managing Director of PI Industries Ltd, unveiled the logo of BASAI. Farmers, agronomists, sustainable experts, policy makers, investors, government institutes, corporate, BioAg manufactures, distributors, suppliers from various parts of globe participated in the meet.

SIMA Paris 2019

A solution for all farmers on all continents, SIMA 2019, an international agri business show held from 24 to 28 February 2019 at Paris Nord Villepinte, France. There were 1,800 companies from 42 countries participated in the event. Aiming to contribute to the development of high performance, sustainable agriculture, SIMA has gained a reputation for its expertise over the years. With a wide range of exhibitors, SIMA showcased comprehensive range of products from various sectors including traction, tilling, sowing, planting, harvesting equipment, services, irrigation, rural and forest area, wood energy, services and institutions, crop protection, storage and packing, milking and dairy equipment, livestock machinery and equipment etc. Krishi Jagran was the media partner of the event.

Evergreen Revolution Reloaded Agriculture Reforms through Agritech Skills and Financial Restructure

Emphasizing all possible ways to solve the agrarian crisis in the present scenario, an event on "Evergreen Revolution Reloaded: Agriculture Reforms through Agritech Skills and Financial Restructure" was organized on February Ist at Leela Palace, Chanakya Puri, Delhi.

The conference was aimed at gathering intelligentsia, academicians, agriculturists, researchers, economists, statisticians, politicians, bureaucrats, students, farmers as well as activists to discuss the feasibility of an expedited short-medium-long term solution for the marginal & small farmer distress, faced by the entire nation today. Importance of updating education & research curriculum as well as teaching methodology, The advantage of affiliations to global educational universities, enhancing productivity through gene-research , advantages of enclosed/greenhouse horticulture over open agricultural cropping, merits& demerits of the MS Swaminathan Report, merits, demerits and possible adaptations to MGNREGS were the major topics discussed in the conference.

National Conference on Climate Services in Agriculture

The Federation of Indian Chambers of Commerce and Industry (FICCI) in collaboration with Skymet Weather, a private Indian company that provides weather forecast and solutions to Indians, organized National Conference on Climate Services in Agriculture-"Building Partnerships for de-risking Indian Agriculture from the impacts of Climate Change" on 25th February at The Claridges, New Delhi.

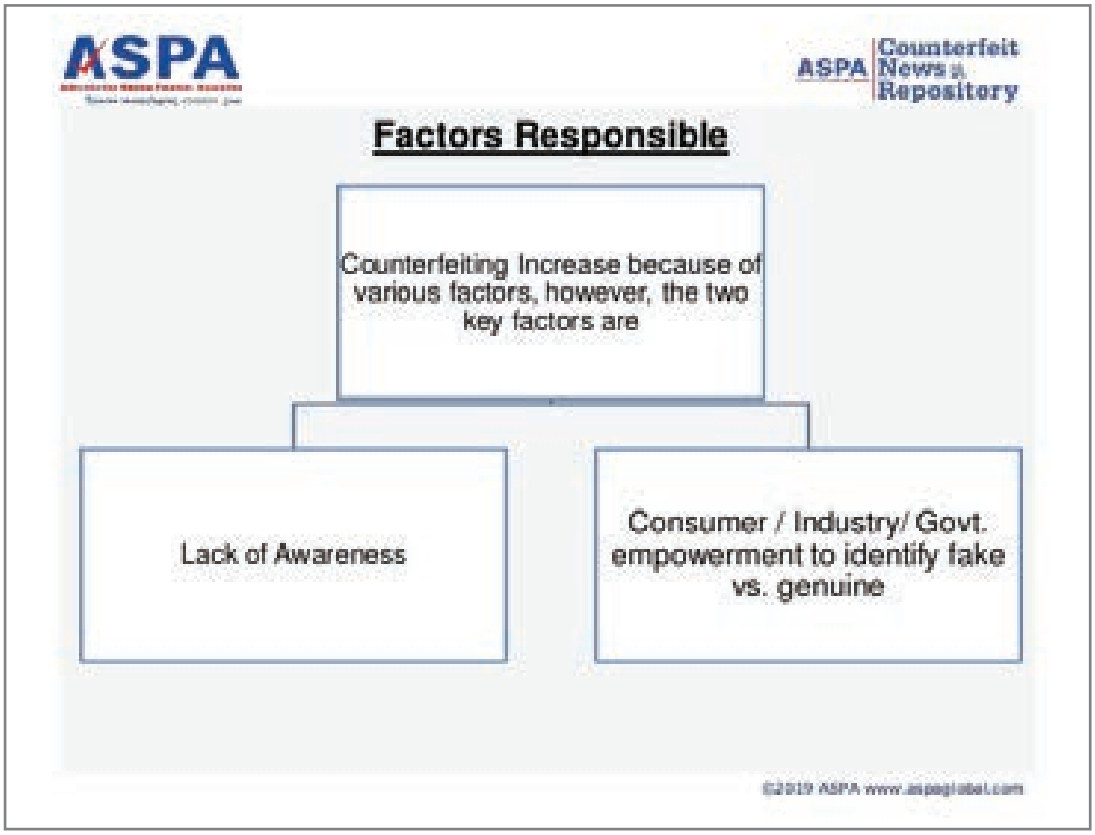
The Conference detailed the unique partnership between The United States Agency for International Development (USA DI) and Skymet, which aims to make climate information, risk mitigation tools and advisory services, more accessible to Indian farmers making them resilient towards weather driven risks. The project is targeted to benefit 80,000 farmers across 31 districts in nine states of India.

Chander Jeena
Secretary of Authentication Solution Providers' Association (ASPA)

Collaborated Solutions-Staying Ahead of the Counterfeiters

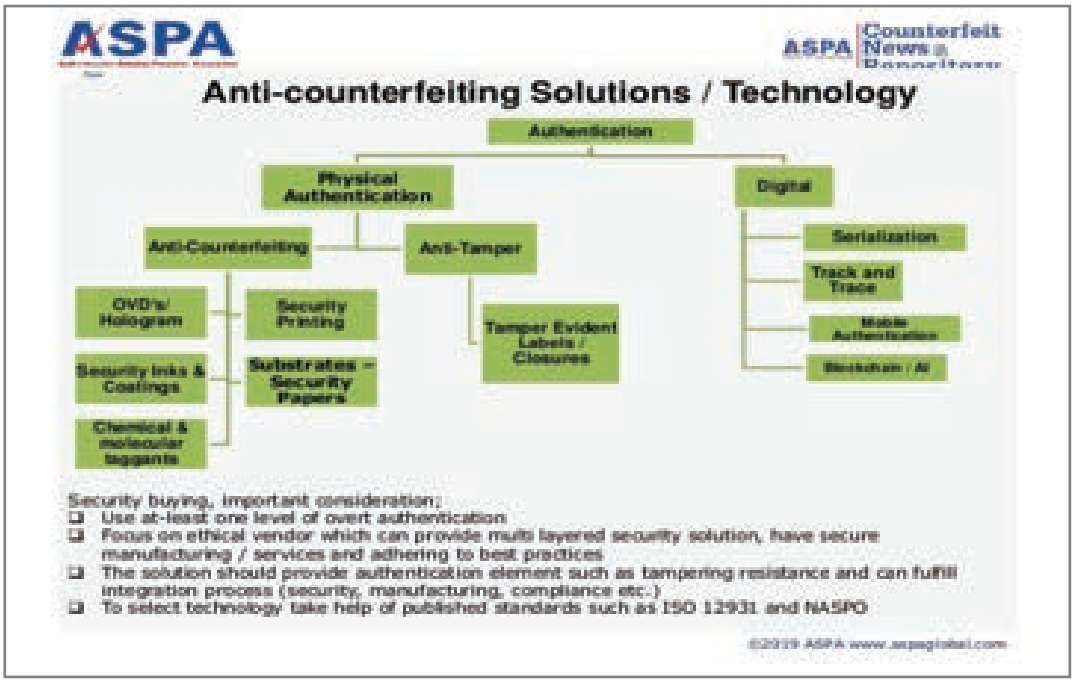
Physical and Digital

Authentication with IoT solutions empowering Consumer, Industry and Government



India is among the 15 leading exporters of agricultural products in the world.Total agricultural exports from India grew at a CAGR of 16.45 per cent over FY10-18 to reach US$ 38.21 billion in FY18. Ministry of Commerce & Industry is planning to introduce an "Agriculture Export Policy" which is aiming at doubling the agricultural exports (US $60 billion by 2022) from the country and thereby integrating Indian farmers and their agricultural products to the global value chain.

The growth of counterfeit plant products are on the rise globally. Illegal pesticides are deemed to make up about 20-30 % of these markets. The nature and extent of counterfeit products and illegal trade varies per market and can originate from many different sources in many different forms. Counterfeit and illegal pesticides in current agricultural scenario have become threating and the magnitude of problems are directly related to the health, economy and environment. Cases of illegal pesticides lessen the ability to regulate the agricultural sector effectively and bring quality products. It is important that farmer organisations, Co-operatives, Industry, NGO's and government or whoever works with the farmers at grass root level, should play a leading



Counterfeit and illegal pesticides in current agricultural scenario have become threating and the magnitude of problems are directly related to the health, economy and environment.

role in increasing awareness about the risks of using counterfeit products.

Chander Shekhar Jeena, Secretary of Authentication Solution Providers' Association (ASPA), editor (The Authentication Times) and Advisory member (Tax Stamp & Traceability News, UK) shares his concerns and opinions and enlists the various factors that lead to counterfeiting.

Various factors leading to Counterfeiting

Difficulty in identification of counterfeit products due to lack of awareness

Lack of education and awareness at the farmer level and so only a very few are aware of the registered brands and often ignore the specific details on the products. Our farmers remain uninformed about the existence of this grave issue and are ignorant about how to deal with it.

Lack of monitoring and surveillance

In India, the responsibility of enforcement is divided between the regional and national authorities, but the political divisions and sensitivities have led to weak enforcement coordination and action. There should be a coordinated approach between the Multi-disciplined specialists' with skills in policy and prosecution, chemicals, agriculture, customs and environment.

Focus on high-Profile sectors

National anti-counterfeit activities tend to focus on high profile sectors where the VAT losses are longest (luxury goods, alcohol, auto components, clothing, software, pharmaceuticals). Anti counterfeit activities needed to be done in the agrochemical sector, so that the farmers get the adequate information and details regarding the sources which impose threat to our environment and health.

Inadequate judicial frameworks and penalties

India has inadequate legislation to properly prosecute counterfeiting. Strict framework of penalties needs to be developed for people making or selling or for that matter using counterfeits.

Challenges of quantifying the problem

It is difficult to present detailed data of the extent and growth of the problem because of its illegal nature. This is the same problem encountered by all sectors that face counterfeiting.

Chander expresses his concerns over Indian farmers lacking a tool/medium to differentiate genuine pesticides from fake ones at the time of purchase and that ourfarmers still rely on the visual appeal and can only check the quality of products with the marking of ISI/AGMARK. However, with the advancement in digital technology, it has become easy for unethical manufacturers to produce fake ISI/AGMARK product as well. Until the crops fail the farmers don't realize and there seems to be no way to analyse the contaminants also and therefore, there remains a constant need to spread awareness on 'How to identify genuine pesticides from the fake ones?'

Proposed solutions for India

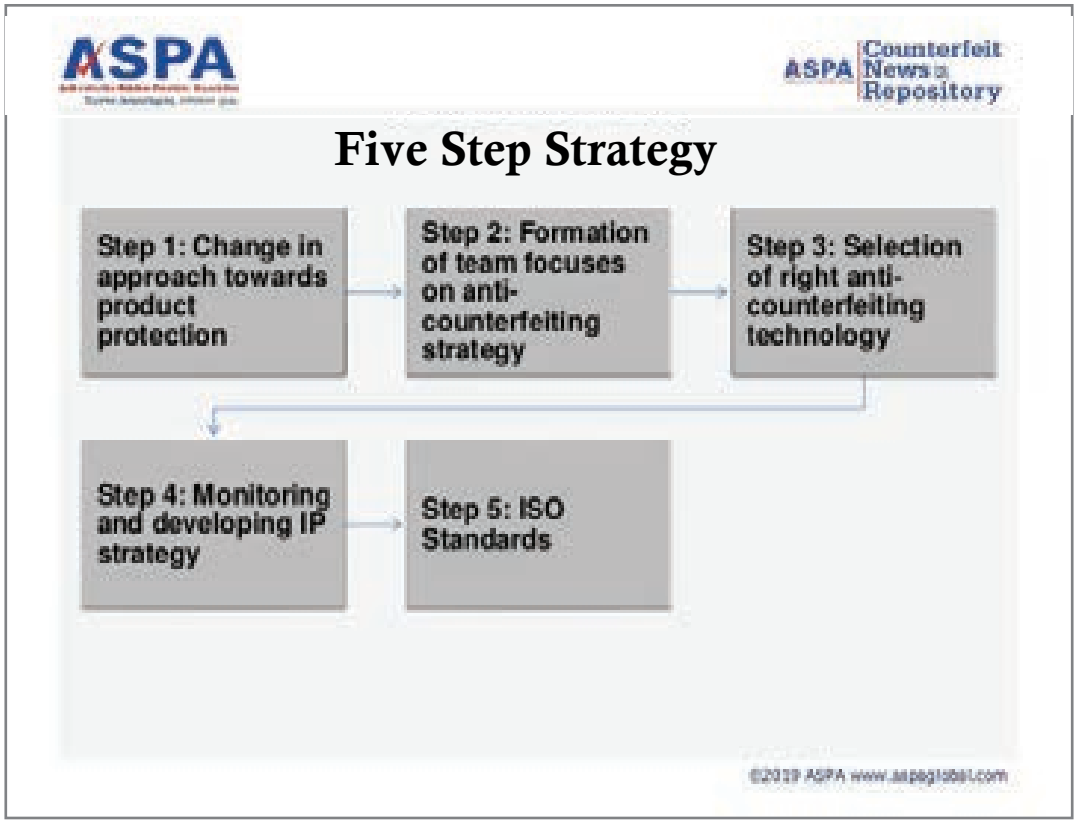
Security label with track and trace features

Focussing on implementation of technology solutions is the need of the moment. As proactive steps, pesticide companies should join hands with authentication solution providers for public interest and for the brand protection measures. The authentication solutions play an important role in consumer protection and help brand owners in increasing revenue by knocking off counterfeiters from the market. There are many technology based anti-counterfeiting solutions, where the Label of the product could be linked with the database of our Indian Government Kisan Call Centre. According to the Indian Government, nearly 70 lakh farmers across the country are registered with the KISAN SMS Portal. The farmers can easily check the originality of pesticides by giving a missed call or SMS at the toll-free number 1800-180-1551 by confirming the unique number printed at label. A message could be then sent to each farmer in his preferred language and that should contain information about the pesticide's batch number, expiry date and originality.

Case studies from the other industries like Pharmaceutical, Automotive components and Liquor -State Excise Department could be referred. Many brands seem to be adopting solutions such as security label with 2D and alphanumeric codes on each individual blister pack, bottle or injectable vial. All effective solutions, broadly speaking, help in identifying and authenticating the original from counterfeit. They deepen the divide between genuine products and their counterfeits by making a genuine product distinguishable in some manner and that it is difficult to replicate using commercially available manufacturing processes.

It is very important that a market surveillance program is in place, so that as soon as an infringement is identified, it is immediately tackled using administrative and/or legal recourse to punish the guilty. If no immediate measures are taken then the counterfeit markets would increase in size in next 5 years, will grow tremendously, and will be a very substantial loss to the Indian Government.

We need to create zero tolerance position towards illegal activities. Implementing a strategy to raise awareness deliver trainings and develop safety features. Empowering consumer and enforcement authorities with the latest new generation technological authentication solutions seems to be the only way as solutions.



Ichiban Crop Science Ltd.

Bringing Difference in Farmer's Life

India boasts of a wide geographical diversity both in terms of geography and agro climatic conditions. From apples in the north to rice in the south, and from grapes in the West to tea in the east, India produces an extensive variety of crops due to this climatic and topographical diversity. India also has a rich history of agriculture being the backbone of its economy. The country takes pride of being a nation that is run by its farmers. With a whopping 60% of the Indian population still depending on agro based businesses, there lies a undeniably huge opportunity to be tapped.

Realizing the aspect of growth and development that can be achieved in this sector, Ichiban came into existence in the year of 2016. However, the idea inception was conceived by Dr. Nikhil started much earlier, understanding the nuances of the agricultural trade as a part of his family run business. After being in sync with the country's varied farming dynamics, internal nitty gritties, connecting with agriculturists all over the country, being in close collaborations with farmers big or small all over the country , and fully consummating the complexities of this historical trade, he grew more passionate about making a sustainable difference and not just get stuck in the numbers. He dreamt and pledged to create an organization much bigger in its reach, much wider in its overall approach; and much more professional in its functionality. Since then, the company has been determined to make a huge difference in the lives of agro producers in India, as well as elevate entire industry to an altogether indomitable level.

Ichiban analysts understood that the per hectare agricultural productivity in Japan is nearly thrice more than in India even though India has a higher land area dedicated to farming. With India's population growing at a

rapid pace, it is important for us to increase our productivity in order to fulfil the demands/ mouths of nearly 1.3 billion people. That is when Ichiban thought of combining 'bharat ki mitti with japan ki shakti ' wherein the scientists at Ichiban started their research on the Japanese method of agriculture to understand how Japan is able to achieve such high level of productivity with limited land area that is available to them. Ichiban dreamt of a collaboration of India's strength and Japan's technology to make an unbeatable range of crop protection formulations for Indian farmers use. With their first office in Delhi, Ichiban started their journey towards excellence. The research team has already created some of the best products in the industry and a state of the art production unit was constructed to make such high-quality products. Ichiban takes pride in becoming the pioneers of these products in the Indian subcontinent. Thanks to its stake holders, within a short span of time, Ichiban proudly commissioned its second unit which will be operation from February 2019!

To produce such novelty and quality products, Ichiban started a sophisticated vertical factory, which was the very first vertical production unit of its kind in the entire region. Not just the factory, Ichiban has also set up a well-equipped research lab for testing their products, innovating new mixtures and keeping a strict check on the quality of every outgoing batch of all the products. Hence, unit of every herbicide, fungicide, insecticide, anti-bacterial and PGR is of the same standard and is exactly same in the composition of their ingredients.

Not just production and manufacturing, for Ichiban distribution is also the key to success. In geography as huge as India, it was compulsory for Ichiban to establish distribution channel across the country dividing it into various zones and appoint personnel to cater to the needs of every region. And with the ever expanding scope of the company, Ichiban has doubled the workforce of agri-professional to 150 in a short span of time. The company conducts motivation building activities and educational seminars to keep its employees up to date with the current scenario, and encourage healthy work ethics.

Not just the employees, but we also have a large distributor base, all of whom are also a part of the Ichiban growth story. The people who chose to trust the founder Dr Nikhil and his vision that is based on his unconventionally dynamic approach. With 3000 plus distributors already on board, Ichiban plans to double the number of distributors in the coming time, so that Ichiban products can reach to every nook and corner of the country.

A company that has an experienced leader, visionary, educationalist, engineer and philanthropist like Dr. Nikhil, nothing can stop it from achieving phenomenal growth. Dr. Nikhil has also achieved some great feats individually because of which, he was awarded with the National Achievers award for agri inputs in the year 2017.

The team at Ichiban are determined to achieve the goals that they have shouldered and the speed at which that they are growing is quite astonishing. With the industry growth rate at just 5-6%, Ichiban saw a phenomenal growth in a short span. Achieving a turnover of 100 crores within one year of company's inception was no cake walk and it has only been possible with the tremendous support of all their associates and stakeholders; dealers, distributors and employees.

Ichiban pledges to make the same dedicated effort and even more every year; to deliver what they have promised to the best of their capacity. Their vision is to service the farmers to increase their productivity and hence their income by providing best technology and inputs. Their mission is to be a top Agri-technology &Input Company in India.

Veda Krishnan, Susheel Kumar Sharma and Shelly Praveen



‘Black Beauty’

Nutri-Rice that is no more forbidden

The Rice Bowl Region of the world, the South East Asian countrieslike China, India, SriLanka, Indonesia, Philippines and Thailand has gain-edincreased attention in recent decades; due to their nutritionally rich black pigmented rice varieties which are assumed as a panacea of many culinary diseases. These countries evolved on their agriculture way of life which centered on riceand emerged as rice giants both in terms of production and consumption.Rice culture dates back to around 10,000 years ago, with the earliest concrete evidence of rice farming that comes from a 7000-year-old archeological site near the lower Yangtze River village of Hemudu in Zheijiang province in China. Even though white rice ruled the world globally being the major staple, its nutritious counterpart – ‘Black Rice’ remained forbidden till recent times.Among the South East Asian countries, China is responsible for 62 % of global production of black rice and it has developed more than 54 modern black rice varieties with high yield characteristics and multiple resistances. It cultivates black rice the most followed by Sri Lanka, Indonesia, India and Philippines etc.The term ‘black rice’ actually refers to a variety of rice types from the species *Oryza sativa*, and is descriptive of the colour of grain (outer layer of grain), rather than other properties. Black rice that got evolved due to the rearrangement occurred in the Kala4 gene promoter region, activates the upstream flavonol biosynthesis genes and result in accumulation

of anthocyanins. This heirloom rice has a rich cultural history, was limited to Emperor's menu and used as a tribute food due to its rich nutritional spectrum.

Manipur is one of the eight north eastern states of India and famous for diverse traditional rice (*Oryza sativa* L.) varieties, is also blessed with ascented black rice variety called*Chakhao* ('chak' means rice and 'ahaoba' means delicious). The aromatic black rice variety is grown in Seijang, TellowChana, Khundrakpam, Sambei in Imphal East district, Wangoo in Bishnupur district, Lamjao, Langmeidong, Thounaojam, Pallel, Tangjeng, Suganu, Konthoujam and Moidangpok in Thoubal district of Manipur. Four different landraces of black rice, viz.*Chakhaopoireiton*, *Chakhaoangouba*, *Chakhaoamubi* and *Chakhaopungdolamubi* is known till date (Fig.1). Among the recorded landraces, *Chakhaopoireiton* is cultivated by most of the farmers (43 %) because of its higher productivity and delicacy. As per local belief, black rice was first cultivated by the 12th Meitei king PoireitonKhunthokpa during 38-18 BC in his capital Poi located at the foothills of Heirok range. Thus the rice landrace came to be known as *Chakhaopoireiton*but not much widely explored for its nutritional and nutraceutical attributes. Thus it still only covers about 10 per cent of the total cultivated rice area in Manipur. Black rice is a whole grain, super nutritious type with high fiber, anthocyanin, antioxidants,

Figure 2 Panicle, grain and kernel of (i) *Chakhaoamubi* (ii) *Chakhaopungdolamubi*, (iii) *Chakhaopoireiton* and (iv) *Chakhaoangouba* landraces of black rice (Borah et al., 2018)

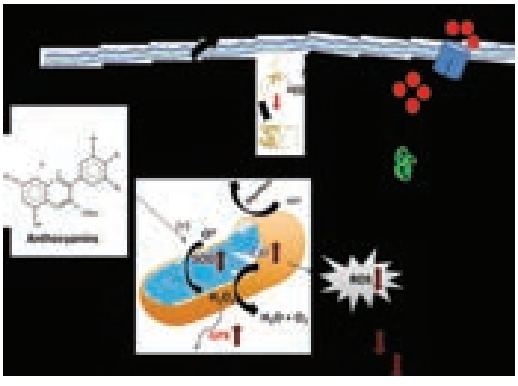


Figure 3 Model of action of anthocyanins present in black rice

Fig.4. Economic potential of black rice (consumption, crude powder as fortificant and as natural colorant)

vitamin B, E, iron, thiamine, magnesium, niacin and phosphorous (Suzuki et al. 2004). For centuries, the nutritional values of this eluded common people, but the traditional knowledge underlined its role as medicine for diabetic patients as well as for other life style disorders.

Type II diabetes (T2D),the pandemic and the 7th major cause of death worldwide has been often associated with abnormal hyperglycemic activity (high blood glucose) but thefree radicals generated as a result of hyperglycemia are the hidden source for the underlined pancreatic cell death. Pancreatic apoptosis, which arrest insulin secretion results due to both gluco and lipo toxicity. Glucotoxicity majorly translate at various levels, through glucose transporter 2 (GLUT2) receptors increasing advanced glycated products, activate hexosamine pathway and glycolysis. These result in high Reactive Oxygen Species (ROS) pool with in the cell which is normally challenged by the inherent antioxidant enzymes (glutathione system, super oxide dismutase, catalase and peroxidase). But unfortunately pancreatic beta cells innately reported to have low antioxidant enzyme activities and hence act as primary targets of glucotoxicity compared to glucose responsive tissues (liver or muscle). Imbalance in the oxidant-antioxidant system will accumulate ROS and in turn activates c-Jun N-terminal kinase (JNK) mediated apoptosis suppressing Akt mediated cell survival pathway (Fig.3). On the other hand, lipotoxicity has been majorly associated with T2D and has been unraveled as phospholipid scrambling phenomenon. In normal cell membrane, neutral phosphatidylcholine and sphingomyelin are mostly found on outer side while charged phosphatidylserine, phosphatidylinositol and phosphatidylethanolamine in the innermost leaflet. During T2D certain ultra-structural changes, like flipping of phosphatidylserine on to the outside leaflet of membrane has been observed and reported as a cause for loss in cell membrane elasticity especially in erythrocytes (Fig.3). Considering the increased incidence of T2D, its management is the need of the hour and black rice rich in anthocyanins can be a preferred choice as it can prevent oxidative stress.

The predominant anthocyanin forms in *Chakhao*are cyanidin-3-O-glucoside, and peonidin-3-O-glucoside (Chang et al. 2010).Other than anti-diabetic potential it's also used as blood tonic due to rich iron content, also considered as good for kidney, stomach and liver.The cyto-protective nature of anthocyanins has been well deciphered (Krishna et al., 2018). This rice also contains higher levels of proteins, vitamins and minerals than common white rice. Compared to white rice, black rice is relatively rich in the mineral contents such as Fe, Zn, Mn and P and has higher variability in mineral content that depend upon varieties and soil types of the planting area (Liu et al. 1995; Zhang 2000). Intensive research on characterizing the metabolite profiles and validating its nutritional and nutraceutical role mentioned black rice powder as one of the nature's most well balanced super food. In addition to that, recommendations of American Health Association, the American Cancer Society and Dietary guidelines of America of increased consumption of black rice to prevent heart disease and cancers paved its way into the global market. Therapeutic effects of anthocyanins, owing to their anti-oxidative, neuro-protective, and anti-cancer nature has boomed the fortification industry where varied percentage of anthocyanin been fortified (2% - 25%) in bread, confectionaries, desserts etc. Success story

of black rice created new health food brands like 'children of nature', 'naturally yours', 'forbidden food' and many more. Concentrates of anthocyanins have also marketed as brands like 'vita foods' or 'actiplants' (>36% anthocyanins) where Asia-Pacific have a huge market as well as consumer demand for this. Black rice farmers were hugely benefitted with the market potential of crude and pure black rice powder as natural colorant (E163)as well as a supplement (Fig.4.). Many more awareness of organic black rice and its products caused a paradigm shift and China being a lead slowly started monopolizing the global market of health food and organic color.

Considering the impact on Chinese black rice farmers, a similar model can be initiated in this direction to uplift Indian farmers. The recent successful venture of the Union Government at Amuguripara in Goalpara district in Assam, where a total of 12 tons of black rice was produced in 13.2 hectares, which comes close to one ton per hectare, is an inspiring example.Other than the nutritional benefits, black rice cultivation also has agronomic qualities like stable grain yield in marginal lands, stress tolerance, and diseases resistance. Cultural beliefs such as it should be cultivated consecutively at least for three years, helps in uninterrupted cultivation of black rice in northeast region. By sensing the global market, it's high time to initiate mass cultivation and improved market connectivity through public-private partnerships.

References

Borah N, Athokpam FD, Semwal RLand Garkoti SC (2018). Black Rice; *Oryza sativa* L.): A culturally important and stress toleranttraditional rice variety of Manipur. Indian Journal of Traditional Knowledge, 17(4):789-794

Suzuki M, Kimur T, Yamagishi K, Shinmoto H, Yamak K (2004) Comparison of mineral contents in 8 cultivars of pigmented brown rice. Nippon Shokuhin Kagaku KogakuKaishi 51(58):424–427

Liu XH, Sun CQ, Wang XK (1995) Studies on the content of four elements Fe, Zn, Ca, and Se in rice various area of China. ActaAgriculturaeUniversitatis-Pekinensis 21(3):138–142

Zhang MW (2000) Specialty rice and its processing techniques. China Light Industry Press, Beijing, pp 47–83

Chang KK, Kikuchi S, Kim YK, Park SH, Yoon U, Lee GS, Choi JW, Kim YH, Park SC (2010)Computational identification of seed specific transcription factors involved in anthocyanin production in black rice. Biochip J 4(3):247–255

Veda Krishnan, SantoshGothwal, Anil Dahuja, Vinutha.T, Bhupinder Singh, Monica Jolly, Shelly Praveen, Archana Sachdev (2018) Enhanced nutraceutical potential of gamma irradiated black soybean extracts. Food chemistry. 245(15):246-253

Geolife Agritech Pvt Ltd

is a fast growing multi-activity business group in India which specializes in Organic range of products.

Vinod Kumar Lahoti, Chairman & Managing Director speaks to Agriculture World.

"Think Organic, Grow Organic and Eat Organic"

Vinod Kumar Lahoti
Chairman & Managing Director
Geo Life Agritech Pvt .Ltd.

What were the goals that you conceptualized when founding Geolife Agritech Pvt Ltd and how far you have succeeding in achievingthem?

Geolife Agritech India Pvt. Ltd., headquartered at Mumbai was established in 2012. Geolife aspired to be a leading provider of organic inputs and to achieve a significant global presence. Over the years, since its inception Geolife has scaled up its Research& Development, Production capabilities and Marketing strategies with focus towards providing the solutions to the market with products which helps in forming part of Organic portfolio and creating Sustainable Solutions in Agriculture. Geolife brand is successful in creating a brand resonance with all its stakeholders especially the farmers and would not have been possible without the technology expertise in our industry and the consistent quality of products. Geolife is also the first company to metamorphose the concept of Nano Technology. Geolife today has a strong presence felt across 19 states of the country with very strong dealer and distribution network of more than 3000 dealers with company growing exponentially across the international market with its presence across 70 countries.

Can you speak on the challenges that Geolife AgritechPvt Ltd has experienced in the company's impressive expansion of growth?

The Indian farmers are less aware of the new technology based products and we have faced challenges in revealing relevant facts to the farmers about the concept, the product, its benefits and the low dosages. Our product development team has worked

rigorously in conducting the comparative trails and educating the farmers about the usage of the product and importance of right nutrition at the right amount to the plants at different stages.

Awareness on importance on the right nutrition for the development of plants has progressed over the years and Geolife has been able to provide the products to the farmers on their demand.

Besides selling the highest quality products, what are the important metrics to measure for a purpose driven business?

As a Value based organization, Geolife imparts core values to its Employees and Distributors so that the right information is passed to the farmers where dealers work to give the right products to the farmers.Each and every member of Geolife works in an ethical way, by imparting the right values to the farmers which inturn improves his productivity and income. Geolife has also managed to keep the overhead costs, inventory costs, variable costs while improving the new client acquisition and operating productivity.

What are the most important initiatives for your company in 2019?

Geolife is continuously working on innovation in new products, employing the best of the R&D and utilizing the sustainable production practices. We are strengthening our portfolio by adding technology driven solutions to help farmers in a better way 2019 is focused on the customized technology solutions with Soil testing, and Geofencing. This technology has already benefited 1000+ farmers where the yields have improved by 40% and while the input cost have remained as low as 20%. This has given the farmer good returns and accelerated them toward precision farming. We are focused on taking it to a higher level and spread it to more districts.

Contributing to society and bringing positive change in the lives of people who directly or indirectly helped us achieve the milestones in such a short span is another focus of Geo Life Agritech Pvt Ltd. **Blood donation camps**, **Tree plantation drives**, **Cycle distribution to the tribal students and establishing a Geolife Youth Club for rural students, where exchange of information, views, ideas is encouraged at every step.** We are helping to open up to them a world of technology and make them understand the latest trends and the new career paths they can choose from. These **are all part of activities that we are looking upto this 2019.**

What is your perspective on Indian Agriculture, its policies and a sustainable future?

Over the last few years, there has been tremendous growth and work done in the agricultural sector with regard to improving the productivity yield of each farm. At present, Policies have to be framed keeping the sustainability issues in mind, with increased interest in sustainable products and creating lesser footprints in the world. With the right approach and vision towards the future, Indian agriculture has the potential to feed the entire world.

Dr. A K Dikshit
Former Emeritus Scientist
(Ex. Head and Professor)
Division of Agricultural Chemicals
Indian Agricultural Research
Institute (IARI)

Safe Use, Risk Assessment

Since pesticides are widespread in worldwide food production, zero hazards or zero exposure is unrealistic. No chemical is safe, larger usages result in destruction and degradation, but what we can do is use it within safe permissible limits.

Pesticide Science is a multidisciplinary field, which is complex and cost intensive. According to a study, the Indian farmers lose crops worth Rs. 2, 25,000 Cr owing to the pests and disease attack every year. Plant protection chemicals played a pivotal role in ushering the era of green revolution and they ensured better production and protection till harvest against unpredictable losses and also helped decrease the extent of vector borne and other diseases. In general, there are several accusations against the usage of pesticides. Its impact on health issues being a major one, Intake of pesticide residues through food and water that has been directed to birth defects, toxicity to fetus, genetic disorders , improper usage and manufacturing of toxic pesticides too. The World Health Organization classifies pesticides based on their acute toxicity. Class I pesticides are considered to be the most hazardous. Many class I pesticides are still in use in India, even though they are banned by other countries. Issues regarding pesticide residues are also very serious a concern globally. It could be attributed to point source pollution like Contamination that comes from specific place (a point) includes spills, wash from identifiable water, from clean-up sites, leaks from storage and

& Registration of Pesticides

container, disposal of pesticides and their containers and Non point source pollution like Contamination that comes from a wide area includes the drift of pesticides through air, pesticide run into water ways, movement into ground water.

Selection of Agro Chemicals for Safe Use

Safety and health are the primary concerns while using chemicals in agri sector. So, the safe usage of pesticides is a significant factor. Selection of the appropriate product and its usage according to the label directions is one of the major steps in safe handling. In addition to the selection of apt product, there are a few other things to follow while using chemicals.

- Right dose or lowest effective concentration
- Moderately persistent
- Appropriate time
- Apply only when population below ETL
- Monitoring surveillance
- Use when really needed, only recommended dose
- If several chemicals are recommended, use the least hazardous/ toxic

Minimizing Hazards & Mitigation of Ill Effects

Exposure to pesticides causes a range of severe health and environmental hazards. It is estimated that nearly 10,000 deaths are reported annually due to the use of chemical pesticides worldwide, with about three forth of these occurring in developing countries. Some of the major measures to mitigate the ill effects of pesticides are as follows:

We have more than 12 crore farmers and six lakh villages and it is not possible for government alone to reach them. Only public-private-partnership (PPP) model can support to meet extension activities requirement of the country.

- Systematic evaluations on persistence and residue levels
- Regular monitoring and enforcement of all the acts
- Observations of pre harvest intervals or waiting period
- Stringency on following Maximum Residue Level (MRL) and Acceptable Daily Intake (ADI)
- Detoxification and decontamination processes
- Regulated and prescriptive use and Integrated Pest Management
- Selectiveness
- Education, training and extension
- Integrated Pest Management (IPM) & Integrated Nutrient Management (INM)
- Integrated Crop Management (ICM) and Good Agricultural Practices(GAP)

Problems –Why and How

When people using pesticides become negligent they run the risk of poisoning themselves, other

animals and plants. Several studies claim that human deaths and loss of wildlife related to use of pesticides in agriculture is mainly due to the inappropriate handling of chemicals. Farmers are unaware of its safe handling and fail to follow the precautionary instructions. It is obligatory to maintain careful and unabating control over the use and handling of these chemicals during the transport, storage, mixing, loading, application and disposal. These are some other major reasons for the adverse effects of pesticides:

- Inadequate occupational and safety standard
- Insufficient enforcement of standard
- Lack of safe handling and application
- Poor labeling of pesticides
- Poorly implemented controls
- Illiteracy and insufficient knowledge
- Misinformation by dealers
- Overuse and misuse
- Unknown pesticides cocktails
- Use of quantity more than required
- Quality and adulteration
- No compliance of Good Agricultural Practices (GAP) and waiting period
- Registration: Pesticides Regulation in India:

Insecticides Act, 1968

Insecticides Act was passed in 1968 and came into force with effect from 1st August, 1971. It regulates Import, Manufacture, Regulate, Sale, Transport, Distribution and Sale of pesticides with a view to prevent risk to human beings or animals, and for matters connected there with.

Need of Public-Private Partnership Model

We have more than 12 crore farmers and six lakh villages and it is not possible for government alone to reach them. Only public-private-partnership (PPP) model can support to meet extension activities requirement of the country.

Constraints in the Studies

The main intention of the use of pesticides is to prevent and control insects, pests and diseases in the field crops. However, simultaneously, they result in contaminating the environment and long-term implications on the society as well. In such a scenario, the studies and research activities on agrochemicals have relevance. In-depth research is needed in many areas such as production, formulation, usage and commercialization of the pesticides. But, it faces several constraints and still considered to be evolving. Some of the major constraints are:

- Non availability of reference standards
- Non availability of metabolites
- Trained man power
- Instrumentation
- Differentiation between the parent compound and metabolites
- Difference standards are being followed
- JPC Recommendations to promote Safety

The Joint Parliamentary Committees (JPC) formed in 2003 on Pesticide Residues and Safety Standards for Soft Drinks, Fruit Juices and Other Beverages, has been set up to frame recommendations on public health issues. The JPC was set up after Centre for Science and Environment (CSE) released its study on pesticide residues in soft drinks. The committee was to review the authenticity of the CSE study and to suggest the criteria for evolving standards on soft drinks, fruit juices and other beverages. In 2005, the JPC set out a clear agenda for governments to ensure the safe use of pesticides. The committee recommended to make mandatory setting of maximum residue limits (MRL) for pesticides before registering it, setting MRLs for deemed registered pesticides, reviewing the set MRLs for compliance with the Acceptable Daily Intake (ADI) of pesticides and monitoring pesticide residues regularly. It also suggests that India should formulate its own food standards which are based on scientific criteria, protect the interest and health of its people, and are in keeping with internationally acceptable norms.

Risk Management

Since pesticides are widespread in worldwide food production, zero hazards or zero exposure is unrealistic. No chemical is safe, larger usages result in destruction and degradation, but what we can do is use it within safe permissible limits. It is evident that the current levels of pesticide used are not within the prescribed limits and many of them which are being used are illegal and duplicates and spurious and so are supposed to be detrimental to environmental and health. So thereby Risk management measures have an important role to play. According to reports of Food & Agricultural organization (FAO), a major effort is needed to mainstream sustainable pest management approaches and practices to build a resilient crop production system and to reduce reliance on pesticides. Furthermore, farmer education and regulatory control of pesticides needs to be strengthened to address pesticide misuse. Moreover, good agricultural practices including intercropping, crop rotation, and natural pest control mechanism can also reduce the use of chemicals in agri sector which will make it more sustainable in future

OUR LEADER SPEAKS

SPECIAL ADVERTISING SECTION

Doubling Export Turnover and Adding Biostimulants

Atul Churiwal
Managing Director

What are the most important initiatives for your company in 2019?

We are very excited about the launch of our patented range of combination products in the field of insecticides. Fungicides and herbicides, which we plan to launch next year. In total we plan to launch about six products in these categories.

Apart from the same, we are expanding our portfolio of biostimulants, which is the fastest-growing segment globally. We are also focusing on global registrations and hope to double our export turnover next year.

What is your general outlook for agriculture economics, product demand, materials pricing, and your revenue outlook for 2019.

The Indian agriculture scene has not been very positive the last three years. The rainfall has been scanty, and though 2018 was better, the rainfall was still below normal. We are quite hopeful that after three moderate years, 2019 should be good for Indian agriculture.

The raw material prices have been rising continuously, and we are now seeing slight easing of the situation. We have targeted 20 % revenue growth in 2019.

What do you view as the top three trends or opportunities in the coming year (products, markets, or economic conditions)?

We believe the opportunities next year would be in the biostimulant and herbicide sector. With the shortage of manpower, India is witnessing a surge in usage of herbicides as there is a trend of using combination products in India,

and any new product in this segment is well accepted by the farmers. Apart from above, farmers are realizing the importance of biostimulants, which are increasingtheir yield, and there is tremendous demand of such products of high quality. They are moving away from cheap quality seaweed products toward genuine quality products, even if the prices are high.

What products contribute most to your growth strategy or core business? Why?

In the Herbicide range Paraquat and Glyphosate are the biggest products as far as value is concerned. Another product that contributes significantly is Pretilachlor. In the insecticide range, the growth is still coming from Cartap and Emamectin.

Apart from this is the PGR segment, and the biostimulant range is growing very fast. We find that where we are able to create a brand like Cartap, Pretilachlor, and PGR, there is steady growth irrespective of the market conditions and climatic conditions.

The challenge is where the brand is not very strong.

Krishi Rasayan Exports Pvt. Ltd
9103371081010-11
atul@krishirasayan.com
www.krishirasayan.com

Growing Registrations, Expanding Portfolio

How will your supply chain change in 2019 (technology, suppliers, markets, etc.) ?

The supply chain is now more technology driven, and we believe that upgrading technology in the supply chain will be required to be economical and have better control. Where raw materials are concerned, it is noticed that whoever can buy , In cash gets the raw material supply; otherwise there is acute shortage. This is great for companies who can buy on cash or have good creditability in the market.

Rajesh Agarwal
Managing Director

What are the most important initiatives for your company in 2019?

Further stretch is planned in Eastern Europe and CIS countries.

We have already obtained 36 registrations; 40 more are expected in 2019.

In Mexico 10 products are in line for registration and should be in place by 2019.

We have acquired 10acres of land in Gujrat at Saykha from GIDC for setting up a plant for making technical pesticides with capacity of 22000MT. This should be ready by late 2019/ early 2020

What do you view as the top three trends or opportunities in the coming year (products, markets, or economic conditions)?

India now is being considered a major source for pesticides across continents. Relentless efforts over the years have resulted in this clear shift. Krishi Rasayan Group companies are among the leaders in going with strength to traditional stronghold and emerging markets

What products contribute most to your growth strategy or core business? Why?

Biostimulants are a relatively new avenue among others. Agro

AgroLife Science Corporation
91 11 40885534
Rajesh Agarwal, rajesh.agarwal@krepl.in
krepl.in

Deepak Pareek
Founder: My Crop and Agri Chain

DIGITIZATION

Enabling Trust, Transparency & Traceability for Better Compliance And Enforcement

The agriculture has been the backbone of the Indian economy for decades, while its share has eroded continuously over past few decades because of industrialization and urbanization. Moreover, as per census 2011, India has approximately 119 million cultivators and this number is decreasing by approximately 2,000 every day. The trend is worrying and will create a natural stretch on the agriculture sector in the future. The rising cost of farming has made it a loss-making affair for the smallholder farmers leading to large-scale despair, pain, and agony hence a shift from being a cultivator to industrial labor also could be seen these days. Farmers have been at the receiving end for a very long time due to the rising challenges stacked against them in the agriculture.

By 2050, the world will need to find enough food to feed 9.7 billion people and it is only possible if there is increase in overall yield of agricultural production by 50%. While reduction in land under Agriculture, Heavy Industrialization and Intensive Urbanization makes achievement of food security a challenge. Various studies over past decades have found that 20-40 percent of global primary and secondary agriculture yields to pests, diseases and nutrition deficiency. This is where usage of plant protection products and fertilizers are vital. From 1970 to 1990 an annual increase of 7-8 percent consumption of agrochemicals has helped in doubling the food production in 20 years globally.

AGROCHEMICAL DOMAIN

The Agrochemical Doman is complex. Its Economic, Environmental, Social and Political Impact is on 1.8 Billion Food Consumers and 7.7 Billion Food Growers. The Domestic pesticide market (2016)in India is valued at USD 2.3 Billion and is expected to grow at 7 percent to reach USD 3.8 Billion by FY 2025.The per hectare consumption of pesticides is 0.6 kg with huge potential of increase.

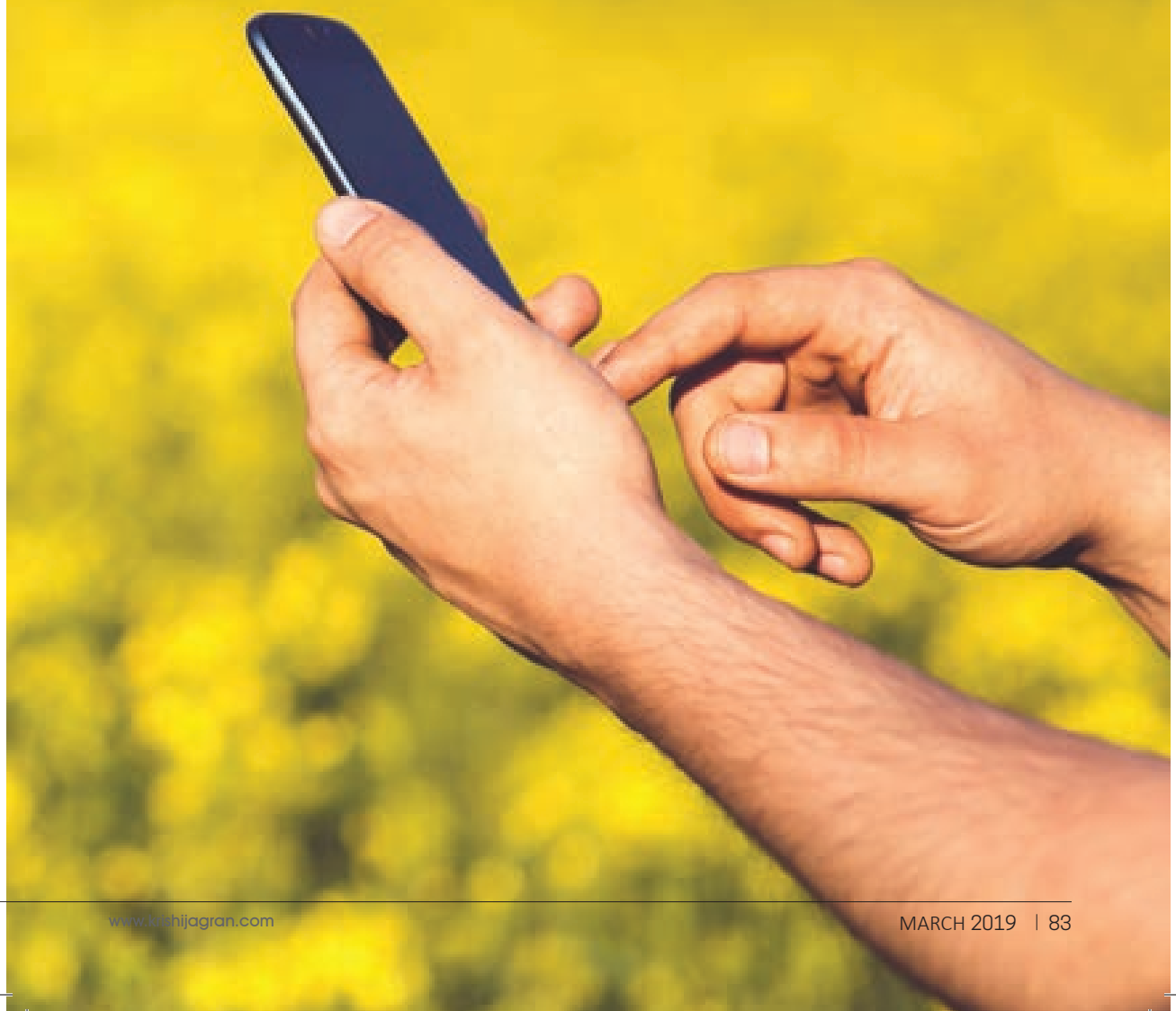
Ideally a pesticide must be lethal to the targeted pests, but not to non-target species, including man. Unfortunately, this is not the case, so the controversy of use and abuse of pesticides has surfaced. The rampant use of these chemicals, under the adage, "if little is good, a lot more will be better" has played havoc with human and other life forms. The overuse of genuine products and a parallel counterfeit industry of the crop protection products pesticides are seen to be the cause of poisoning the ecosystem and health. There is a significant share of illegal, counterfeit, non-genuine agriculture crop inputs in the Indian market. These products are considered inferior and are unable to deliver the outcome efficiently to the end user, the farmer. Unintentional poisoning kills an estimated 355,000 people and impact 25 million agricultural workers globally each year. Agrochemicals are responsible for the high toxicity in the food we eat, crop loss, ecosystem damage, loss of revenue to farmers and there by food security.

By conservative estimates, India suffered a loss of 11 million tons out of 275 million tons of food grain production in 2016-17 because of spurious agriculture inputs. Further, it is negatively impacting fruit and vegetable exports market, worth USD 2 Billion. In light of this, India's position as one of the top food producer and exporter in the world is also at stake. There is no denying that the damage through such products is multi-fold and they pose a significant threat to various stakeholders especially farmers and manufacturers.

Key reasons behind the proliferation of these products could be attributed to lack of awareness amongst the farmers, difficulty in differentiating between genuine and non-genuine products, supply chain inefficiencies, law enforcement challenges and influencing power of point of sale players, i.e. distributors/retailers. The maximum impact of spurious agriculture input is in "Crop Protection" market segment because of its obvious vulnerability due to higher unit cost and ease in fooling the system.

In the wake of this FICCI conducted a nationwide study to understand the situation of spurious (non-genuine/illegal) products in 2015. The study revealed that spurious pesticides market constitute USD 525 million in FY'13 which was 25 percent by value and 30 percent by volume of the domestic crop protection industry. Further, the study also indicated that this market is expected to grow at approximately 20 percent per year in value terms and if the problem is not addressed it can reach to approximately 40 percent share by value in the crop protection industry by FY'19 in India. The total spurious crop protection product market in India would be more than USD 1.5 Billion in FY'19.

The complexity in regulatory and compliance environment in India could be partly responsible for the above problem. Along with various ministries and departments at federal and state level two key organizations responsible for management of pesticides and their residue in food are the Central Insecticides Board & Registration Committee (CIBRC) and the Food Safety and Standards Authority of India (FSSAI). Further many laws are enacted, enforced by different departments, including The Insecticides Act-1968, The Environment



(protection) Act-1986, Bureau of Indian Standards Act, Air (Prevention &Control of Pollution) Act-1981, Water (Prevention &Control of Pollution) Act-1974, Hazardous waste(management & handling) Rules-1989, Food Safety and Standards Act-2006. Enforcement of these laws in a sector where close to 100 large and mid-sized agrochemical producers with 1000+ units and thousands of products along with a large number of Micro Small and Medium Enterprises (MSME) producers is a challenge. These products are retailed through close to 200,000 sales points and 15,000 cooperatives to 1.5 billion farmers.

Taking into account our consumers, industry, and farmers, some immediate measures for transformation, needs to be taken up. Various studies and scholars have attempted to propose technology-based solutions to combat spurious agriculture inputs products in the supply chain. The most practical manner to solve this menace is to create a technology platform of Trust, Transparency, Efficiency and Accountability, which can ensure the flow of only authenticated product across the supply chain.

Agrichain- A Blockchain based framework for Better Enforcement and Counter the Counterfeits

The Digital technology has created avenues of a problem but it also has enabled solutions. As per research at My Crop, the global spending on digital transformation technologies in agriculture was close to $47 billion in 2018 and will grow at an average rate of 15percent over the next five years to hit $94 billion by 2022.

The counterfeiters have been making use of the advanced digital technology as they can easily produce packaging material similar to or better than that of genuine products. In simple terms,we need to create a supply chain network for agriculture input industry powered by **Block Chain**.

The three main properties of the Blockchain Technology are De-centralization, Transparency, and Immutability. It is an integrated platform for farmers, retailers, distributors and manufacturers to ensure seamless integration and sharing of transaction

By 2050, the world will need to find enough food to feed 9.7 billion people and it is only possible if there is increase in overall yield of agricultural production by 50%.

information with each other. It must ensure and promote digitization of the supply chain and hence is able to track both the product and contextual data of the product throughout the network. The network must use the power of technology to make data capture and sharing possible among players who have a conflicting interest in the supply chain. Authentication solutions based on blockchain like AgriChain have multiple benefits as they provide tamper-proof products, product authentication and accountability and tracking and tracing of product till it's consumption. Further, such solutions unlock lot of value for multiple stakeholders.

Farmers

- Protection against, counterfeit, mislabeling, mixing and duplication frauds
- Get expert insights with their agriculture input historic data from the network
- More efficient supply chain means economic products
- Better yield and quality of output

Manufacturers

- Eliminate losses in revenue and trust due to counterfeit, mixing and duplication
- Visibility in the supply chain on near real-time basis increases efficiency
- Helps in weeding out players who indulge in mixing fraud
- Enables in demand prediction based on the collection of historical data

Government & Regulator

- Enhance crop production
- Promote sustainable agricultural production
- Improve profitability of farmers
- Reduce public and occupational health risks
- Meet obligations under international conventions
- Efficient chemical life cycle management
- Minimize negative environmental impact
- Ensure compliance and better enforcement
- Eliminate illegality and malpractices
- Safeguards revenue by eliminating tax losses
- Ensure better image globally for promoting Sustainable Agriculture

Complete Supply Chain

- Seamless communication channel among supply chain players
- Best practices get encouraged and reduce errors and frauds like mixing and duplicates become more and more difficult
- Better management of inventory based on historical data
- Increased efficiency with a reduction in waste and better transportation practices
- Faster business relationship building among players
- Overall efficiency and transparency paves the way for the price reduction of the product.

"Amber Crop Science Pvt. Ltd."

Superior Quality, Increasing Demand, Exports

Amber Crop Science established in 2008, is an Indian Agrochemical Company that provides full crop protection solutions to farmers. Some excerpts from the exclusive interview of Mr. Sanjay Gupta, Managing Director, Amber Crop Science Pvt Ltd. with Tooba Meher, Senior Correspondent, Agriculture World.

What were the goals that you conceptualized when founding Amber Crop Science Pvt Ltd. and how far you have succeeding in achieving them?

Amber Crop Science always wanted to work in the interest of the farmers. We are continuously working on innovations in our product lines with a focus towards providing the right solutions to the farmer and thereby creating Sustainable Solutions in Agriculture. As a brand we are successful and has a network of 300 distributors with company growing exponentially across the domestic market. This year we are planning to introduce our products in the International Market and are working on unique products for the international market.

What products Contribute to your core business?

We have a series of many insecticides, pesticides, fungicide, PGR and almost all required in the market. There are more than 150 products in our basket like Kendo, Brix, Tando, Proceed, Abhedh etc. Our product Brix contains Hexaconazole 75% WG. It is a systemic fungicide and using it on field solves the problem of fungus. The correct usages of these products have given good response from farmers. Another product, Tando contains Bruprofezin 20% + Acephate 50% WP. It solves the problem of black hopper pests from paddy crops. At present, our focus is on Bio-Ag solutions as they can provide better solution for the crop and soil. We are looking for solutions where in the usage of chemicals could be drastically reduced.

How do you think the new shift in your product line would benefit the farmers?

We are at presently working on creating awareness about the biologicals. Our product ranges include neem based bio pesticides and mycorrhiza based bio-fertilizers. Thus, Biological truly would provide a better platform for the field.

Is import of products from China important to Indian agro-chemical industry?

At present we feel its important, but as time passes we think India would get better and would be self reliant in the area of Technical manufacturing

How can industry solve duplicacy of the products?

There is a widespread need to educate the farmers to stop this duplicacy. Duplicate products can't provide the same quality as of branded products. Only the end user, the farmer can put an end to these products. There should be Policy and Technology based solutions to solving these kinds of problems.

How strong is your R&D System?

We have an amazing array of technically competent technical expertise working on the quality and lab testing of our new molecules.

Greater Efficiency on Global Dairy Farms Drives down

Greenhouse Gas Emissions

Chris McCullough
Overseas Correspondent [UK]

Green House Gas emissions (GHG) from dairy cows have shown a decline globally over a ten year period, a new study has found. The report entitled as "Climate Change and the Global Dairy Cattle Sector" was launched by the Food and Agriculture Organisation of the United Nations (FAO) and Global Dairy Platform.

Over a ten year period from 2005 to 2015, the study calculated GHG emissions from the dairy sector and found reductions in all regions of the world. The analysis identified that, on average, greenhouse gases emitted in the production of milk have decreased in 'emissions intensity,' which is emissions per unit of product, by 11 percent from 2.8kgs to 2.5kgs CO_2 equivalents per kg of product produced.

The study reports that the largest reductions in emission intensity occurred in low and middle income countries with traditionally low

With 363 million dairy cows on 133 million dairy farms around the world, supporting the livelihoods of one billion people, the importance of dairying to socio-economic and nutritional outcomes must be balanced against the need for improved environmental outcomes.

productivity. While developed dairy regions also reduced the intensity of emissions, the FAO noted that the percentage improvement was not as substantial because these systems were already operating at much lower rates.

Over the same period, global dairy production has grown by 30 percent to meet consumers demand for high-quality nutritious food products by increasing both cow numbers and average milk yields. As a result of increased global output, absolute emissions rose by 18 percent globally. Importantly, the FAO notes that without the efficiency improvements made by the sector, total emissions from dairy would have increased by almost 38 percent, over double the current levels being achieved.

The report also details where opportunities in current knowledge and potential breakthrough technologies exist for the sector to pursue,

noting the limitations associated with operating in biological systems. The sharing of technical knowledge with all dairy economies is fundamental to maintaining the sectors continuous improvement ambitions at a global level.

With 363 million dairy cows on 133 million dairy farms around the world, supporting the livelihoods of one billion people, the importance of dairying to socio-economic and nutritional outcomes must be balanced against the need for improved environmental outcomes.

Lead author of the report, Carolyn Opio, FAO's Animal Production and Health Division, said: "The analysis quantifies the progress of the sector in improving the efficiency of production. The report also recognises there is more for the sector to do to play their part in mitigating climate change. "We encourage the dairy sector to build on the progress to date to identify and implement appropriate and sustainable solutions that provide nutritious food for the growing world population," she said.

Donald Moore, executive director of the Global Dairy Platform and chairman of the Dairy Sustainability Framework that commissioned the study said: "More than six billion people around the world regularly consume milk and dairy foods as an affordable, accessible, nutrient rich food, supplying energy and significant amounts of high-quality protein and micronutrients. "Analysis from independent authorities such as the UN FAO, provide important guidance for the sector in its efforts to responsibly produce high quality nutrition in ways that respect the environment, the farmers that produce it and the animals it comes from.

"The dairy sector recognises the responsibility it has to continuously improve its performance. We are on the right track, but there is still more to do and the importance of timely, quality data to help track and manage performance cannot be under estimated. "The work of initiatives such as the Dairy Sustainability Framework (DSF), established in 2013 as the vehicle for improving and quantifying the sectors sustainability performance, demonstrates that dairy is committed to continuously seeking ways to reduce GHG emissions from farms and businesses by all economically viable means, regardless of where they are operating or their stage of sustainability development," he added.

Cow toilet to reduce ammonia emissions

THE Dutch are renowned for inventing some real wacky equipment for livestock but the latest one really has left farmers feeling a little bit 'flushed.' Based in Doetinchem, the innovative company Hanskamp has developed a cow toilet that collects urine in an effort to reduce ammonia. Designed primarily to ease the ever increasing regulations on the dairy industry the CowToilet is an automatic urinal that cows use voluntarily and is designed to collect urine before it hits the floor.

Approximately 90 percent of ammonia emissions come from agriculture according to Wageningen University and Research (WUR) in The Netherlands. Excess ammonia emissions are a big deal in Europe and there are national limits in force aimed to reduce gases. When manure and urine mix, ammonia is formed. If this is released into the air, it can precipitate in nature, causing large amounts of nitrogen to end up on the ground. Plants can only process up to a certain amount of nitrogen and the remaining amount acidifies the soil and affects the groundwater. High concentrations of ammonia are harmful to humans and animals.

In an effort to limit ammonia emissions from the agricultural sector, dairy farmers have to pay high fees to meet ammonia emission and manure disposal requirements.

The Cow Toilet is placed against the cow's suspensory ligament and moves in unison with the cow. The technique locates the nerve, and once located, the nerve, which triggers the urinary reflex, is stimulated and the cow starts urinating.

Cows have a natural nerve reflex just above the udder that when rubbed causes them to immediately urinate. Hanskamp has developed this new CowToilet to automate this long-known technique to make a cow urinate.

The CowToilet is placed against the cow's suspensory ligament and moves in unison with the cow. The technique locates the nerve, and once located, the nerve, which triggers the urinary reflex, is stimulated and the cow starts urinating. The urine is collected in the CowToilet container and extracted through a suction line into a separate storage tank. Cows go to and use the CowToilet voluntarily because each visit to the toilet is combined with the animals receiving their daily portion of feed.

As most of the urine is collected this results in a significant reduction in ammonia emissions which is good for both the environment and animal welfare as well as providing a healthier climate in the shed.

The CowToilet also offers economic advantages as it saves on manure storage costs and may even be an alternative to ammonia emission reducing floors. As a welcome sideline, using the CowToilet may even provide some income as pure urine can be used as a high quality raw material in, for example, precision fertilisation. There are also ongoing developments in which urine is used to generate 'yellow' power or as a source of hydrogen. The first CowToilets are expected to be available from mid 2020.

AGRICULTURE WORLD
krishi jagran

KRISHI JAGRAN in Limca Book of Records

For Online Subscription of Krishi Jagran and Agriculture World
http://subscription.krishijagran.com/

Subscribe Krishi Jagran & AGRICULTURE WORLD

India's Largest circulated Agri Rural family magazine recognized by Limca Book of Records.

The only magazine published in 12 languages, reaching 22 states through 23 Editions, 23 Years & 9 Portals.

The Magazine is having a combined readership of nearly 12 Million

Subscribe & Join

Published in Hindi, English, Tamil, Telugu, Kannada, Malayalam, Bengali, Assamese, Odia, Gujarati, Marathi & Punjabi.

AGRICULTURE WORLD (English) Subscription Tariff Single Copy- ₹ 100/-

Period	Copy	Rate	Assured Delivery Charges	Total
6 Months	6	600	180	780
1 Year	12	1200	360	1560
2 Years	24	2400	720	3120
3 Years	36	3600	1080	4680
5 Years	60	6000	1800	7800
10 Years	120	12000	3600	15600
15 Years	180	18000	5400	23400

KRISHI JAGRAN Subscription Tariff Single Copy- ₹ 50/-

Hindi, Punjabi, Gujarati, Marathi, Kannada, Telugu, Bengali, Assamese, Odia & Tamil

Period	Copy	Rate	Assured Delivery Charges	Total
6 Months	6	300	180	480
1 Year	12	600	360	960
2 Years	24	1200	720	1920
3 Years	36	1800	1080	2880
5 Years	60	3000	1800	4800
10 Years	120	6000	3600	9600
15 Years	180	9000	5400	14400

Bank Account Details:
DSR AGRI MEDIA PRIVATE LIMITED
Account No. 007105007788, Bank: ICICI Bank
Branch: Green Park,
IFSC: ICIC0000071

LinkedIn | krishijagran | @krishijagran | 9891405403 | krishijagran

Send Cheque/DD/Money Order in favour of Krishi Jagran to any of the offices address given below -

Head Office: 60/9, 3rd Floor, Yusuf Sarai Market, Near Green Park Metro Station, New Delhi-110016
Tel: 011-2651 1845, Email: circulation@krishijagran.com

Keral: Kumara Vilas, TC-29/1902, Elankom Gardens, Vellayambalam, Sasthamangalam P. O, Trivandrum
Phone 0417-4059009
Email: malayalam@krishijagran.com

Karnataka: 1st Floor, 33/3, B M Mansion, Geddalahalli, Sanjay Nagar, Main Road, RMV second stage, Bangalore -560094, Mob. 9448015099
Email: kannada@krishijagran.com

Tamil Nadu: Subadarasan's Tharanis Orchid, 654-E, Central Studio, Trichy Road, Singanallur, Coimbatore - 641005, Tamil Nadu, Mob. +91 9811758683
Email: tamil@krishijagran.com

Telangana: No. 301, 3rd Floor, R.K Apartments Barkatpura, Hyderabad -500027, Mob. 9866624025
Email: telugu@krishijagran.com

West Bengal: 3rd Floor, 19, N.S. Road, Kolkata - 700001
Mob. 9674853530
Email: bengali@krishijagran.com

Bihar: Kesri Sadan, 4th Floor, Near Bank of India, Jamal Road, Patna-800001, Mob. 9891667686
Email: hindi@krishijagran.com

Odisha: KVK- Khordha (ICAR), Kausalyaganga Bhubaneswar- 751002, Odisha, Mob. 9938103885
Email: odia@krishijagran.com

Assam: House No. 16, 2nd Floor Ambikagiri Nagar (Near Lakhi Mandir) Guwahati, Assam 781021
Mob: 9101353580 Email : assamese@krishijagran.com

Maharashtra: C/o Athashri
Xion Flat No. 511, Near Big Bazaar, Hinjavadi Phase -1
Pune - 411057 MH
Mob: 9891729800, Email : marathi@krishijagran.com,
www.krishijagran.com.

KRISHAJ

Rooted yet
Thinking Big

KRISHI RASAYAN EXPORTS PVT. LTD.

AGRICULTURE WORLD
krishi jagran

KRISHI JAGRAN in Limca Book of Records

Krishi Jagran, World's Largest Circulated Multilingual Agri Rural Family Magazine with 12 Languages (11 Indian & 1 Global), 23 States, 9 Portals – 12 Million combined readership (Krishi Jagran Hindi, Punjabi, Gujarati, Marathi, Kannada, Telugu, Bengali, Assamese, English (Agriculture World), Tamil, Odia and Malayalam)

STAFF REQUIRED

KRISHI JAGRAN GROUP OF PUBLICATIONS

Staff Required for all State Capitals

Marketing Team

Trainee Executives (120)
Marketing Executives (60)

Marketing Managers (21)
General Managers (4)

The person should be graduate, smart, well mannered with excellent communication skills in respective vernacular languages and English. For 2nd and 3rd positions experience in the same field is must.

Trainee need not be graduate but must have keen interest for a career in marketing. If you think you are the right person.

Editorial Staff

Journalists (21)
Reporters (42)

Translators (12)
Editorial Staff (12)

To strengthen our editorial team we are looking for fresh talents. The candidate should be graduate from a renowned university and should have flare to write. Knowledge of different Indian Languages will be an added advantage.

Freelance Journalists: We welcome journalists who want to contribute to our publication as well as portal. The remuneration will be attractive.

Staff Required

Regional Managers and Executives

Regional Circulation Manager: (Education – Graduate / Experience – 3-5 years)

Applicant must be graduate having an experience of min. 3-5 years in sales of agriculture inputs, seeds, pesticides, fertilizer and agri machinery. Applicant should have a good communication skill and should be friendly with progressive farmers. Salary is negotiable for enthusiastic candidates who are willing to work.

Regional Circulation Executive (Education – 10th pass / Experience – Not required)

Applicant should have a good communication skills and a convincing nature to disseminate the knowledge among farmers. Qualification must be 10th pass. If you are not experienced and willing to work then you are on the right platform. Come and grab the opportunity and make your dreams come true. Salary is negotiable for enthusiastic candidates who are willing to work.

To Apply - Email: jobs@krishijagran.com

KRISHI JAGRAN
60/9, Yusuf Sarai Market, Near Green Park Metro Station, New Delhi - 110016
Tel: 011-26511845 / 26517923 / 45503170 Email: info@krishijagran.com, www.krishijagran.com

100% QUALITY ASSURANCE

rainbow

स्वस्थ फसल . खुशहाल किसान

MILLIONS OF FARMERS BENEFITTED & COUNTING...

Toll Free, Helpline:

1800 843 0123

www.rchl.co.in

Rainbow Crop Health Limited

AN ISO 9001 : 2008 certified company
Regd. Office: Welcome complex, NH 73, VPO Mouli, Distt.
Panchkula-134118 | Email: care@rchl.co.in | www.rchl.co.in

krishijagran

24 Years | 12 Languages | 22 States
23 Magazines | 12 Million Readers
9 Agri News Portals

https://www.facebook.com/krishi.jagran/

1) 512 Krishi Jagran Kisan Clubs, 489 Districts, 22 States & 1 main KJ Kisan Club
2) 39 Krishi Jagran facebook Pages
3) 10,00,000 + farmers are directly connected to Krishi Jagran Kisan Clubs & Pages
4) Facebook post reach (Average) 3 Crores +
5) 5 News post on Facebook Pages every hour

Page	Likes	Followers	Max. Post Reach
• Krishi Jagran	5, 10,771	7,98,414	5, 20, 523, 51
• Agriculture World	30, 523	58,3894	5, 13, 996
• krishi Jagran Hindi	51,683	108,540	96, 62, 217
• Krishi Jagran- Conference, Exibitions, Seminars	11, 220	11, 409	1,70, 318
• Krishi Jagran- Companies Products & Promotions	10,102	10,984	1,20,402
• Kerala	7, 829	8,127	1,40,716
• Madhya Pradesh	34,112	39, 567	13,17,242
• Bihar	29,542	64,488	4, 12 117
• Karnataka	7,583	8, 749	3, 92, 724

WhatsApp Group Details

+91 9891 405 403

State wise and district wise (Selected) krishi Jagran whatsApp groups (635)

States	District groups	States	District groups
State Wise	23	Punjab	20
Jammu and Kashmir	22	Odisha	30
Himachal Pradesh	12	Assam	33
Madhya Pradesh	51	Sikkim	4
Chhattisgarh	27	Goa	2
Haryana	21	Manipur	16
Uttar Pradesh	72	Meghalaya	11
Rajasthan	33	Tripura	8
Uttarakhand	13	Arunachal Pradesh	16
Jharkhand	24	Tamil Nadu	32
Bihar	38	Telangana	31
Gujarat	33	Kerala	14
Maharashtra	36	Andhra Pradesh	13
		West Bengal	23

Data relevant to that particular state will be shared on whatApp groups

Association of Indian Magazines

ACCORDING TO IRS 2018, TOTAL READERSHIP

Social Media PLATFORM

Join Us Join Us Join Us Join Us Join Us Join Us Join Us

YouTube Channel

https://www.youtube.com/channel/UCy5uIHLkQrHYd6Dj8CsqHrw

You are welcome to share

Interviews | Success Stories | Advertisement | Documentary

Videos on Krishi Jagran YouTube channel

LinkedIn

https://www.linkedin.com/in/krishi-jagran-41120680/

twitter

https://twitter.com/krishijagran

Instagram

https://www.instagram.com/krishijagran/

OF MAGAZINES HAS GROWN TO 95% IN IRS 2017

मज़बूती में प्लस
माइलेज में भी प्लस

MRF
SHAKTI LIFE PLUS

✆ TOLL FREE: 1800 419 4888

हमारी वेबसाइट पर आइए: www.mrftyres.com | ईमेल: write2us@mrfmail.com

MRF किसान का दोस्त

TVS

NEW SPECIAL EDITION

TVS Sport ELS

MILEAGE KA BAAP

Sirf ₹40,123* Se

With Looooong Seat ....

TVS 5 YEAR WARRANTY^

BEHTAR MILEAGE

₹0 Down Payment# | 15 MIN Loan Approval**

*Ex-showroom price Delhi of TVS Sport KS Spoke BS IV Variant. Prices subject to change without prior notice. ^5 year warranty without any additional charges. #On exchange. **Finance at the sole discretion of the financer. Schemes cannot be clubbed. T&C apply.

Published on 25th & Posted on 27-28 at NDPSO in Advance Month RNI No. DELENG/2015/65174 Postal Reg. No DL-SW-1/4191/19-21