

Far Eastern Agriculture

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Managing Black Sigatoka in banana plantations

Poultry health management:
Hygiene checks at the farm

Latest developments in
farm sprayer technology

Food engineering
in focus at VIV Asia



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2018**

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Indian FMCG switching from coal to biomass

GSH GROUP INDIA has won the Environment category at this year's Energy Institute Awards for its work with Indian FMCG firm Kaleesuwari on switching from coal to biomass products including turmeric and sawdust.

GSH has worked with Kaleesuwari since 2015 to manage its refineries in India to produce steam used in the extraction of oils from nuts, seeds and other raw materials for sale into the food, personal and household markets.

In November 2017, they started to mix biomass – including sawdust, wood charcoal powder and turmeric – with coal as a fuel for the fluidised-bed combustion boilers in two power refineries in Palani and Chennai. Over the course of the following six months, this increased to 60 per cent and 20 per cent biomass respectively. GSH achieved a 60 per cent reduction in CO2 emissions together with a 15 per cent reduction in the cost of steam.

Biomass ash content is low compared to coal, making for easy and more environment-friendly disposal. And the products, which are sustainably sourced from close to the refineries, are safer to store.

The results have been so positive that GSH is now in the process of switching over completely to biomass and increasing the range of biomass products it uses, including chilli powder.

The announcement was made on 22 November 2018 at an awards ceremony at the Sheraton Grand London Park Lane in front of the industry's leading figures. The awards recognise schemes and projects that enhance the environment or offset carbon emissions including a demonstrable commitment to managing the risks of energy to the environment and reducing the carbon footprint of the industry. GSH faced fierce competition in this category – including a project to reduce air pollution in Beijing and another in an Iranian gas refinery.

Malcolm Brinded, president at Energy Institute, said, "Beating climate change – while extending the tremendous benefits of energy to all populations – calls for innovation and a lot of hard work, by many smart people, all around the world."



FMCG replaces coal with turmeric.

Yili announces first annual report on biodiversity protection

YILI GROUP, A state-owned company of dairy industry in China, has announced the world's first-ever report on biodiversity protection at a conference in Egypt.

The 14th Conference of the Parties to the United Nations Convention on Biodiversity took place from 14-29 November 2018 in Sharm el Sheikh, Egypt.

Representatives from more than 190 contracting states of the convention on biodiversity took part in the event and discussed in detail policy measures for the integration of biodiversity in agriculture, forestry, fisheries and tourism.

Zhang Jianqiu, CEO of Yili Group, shared practices and experience in its protection of biodiversity with the guests and announced the "Annual Report on Biodiversity Protection of Yili Group," the first ever of its kind in the world.



Yili hopes that more and more Chinese enterprises will join hands with them to protect biodiversity.

Zhang Jianqiu noted that apart from development, Yili is going ahead with the idea of "Green Leadership" proposed by Group Chairman Pan Gang and is pushing forward with the strategy "Green Industrial China."

It is on this basis that the "Chinese Sample" of biodiversity protection has been produced gradually, characterised by "Disclosure, Management and Popularity" over the years.

The 15th Conference of the Parties to the UN Convention on Biodiversity will be held in China for the first time in 2020.

US and Japan to help Pacific island nations to counter illegal fishing

JAPAN AND THE US are collaborating to provide training to maritime authorities of the Pacific island countries to better combat illegal fishing within their exclusive economic zones (EEZs).

As reported by *The Japan Times*, officials from 12 countries including Palau, the Marshall Islands and Micronesia joined at a conference in Japan and were trained the ways Japan Coast Guard conducts policing and visit related facilities

Illegal fishing activities are one of the major challenges for the Pacific island nations as a number of foreign vessels from the neighbouring as well as international countries were observed to be fishing illegally.

In May 2018, Japan hosted a summit of Pacific island nations in Fukushima Prefecture, where Prime Minister Shinzo Abe expressed the government's readiness to assist countries in the Pacific island to train them in maritime operations.

The proposed training programme, in partnership with the US authorities, is part of this initiative, added the source.

The source further added that Japan has sent its Coast Guard officials to some Pacific Island nations to assist them.



Pacific island nations aim to combat illegal fishing activities.

Benchmarks determined for smart agriculture



Image credit: Expoglobe Sdn Bhd

More than 9,500 participants took part in the 3rd edition of Malaysia International Agriculture Technology Exhibition.

THE 4TH EDITION of Agri Malaysia will be held from 26-28 September 2019 at Setia City Convention Centre 2, Shah Alam, Selangor, focusing on a range of cutting-edge agricultural technologies.

Agri Malaysia 2018, held in last September, led by more than 170 agriculture exhibitors focusing on agriculture core model from planting technology, crop protection, farm automotive, consultation services, smart farming and many more. YB Sim Tze Tzin, deputy minister of agriculture and agro-based industry was present at the Agri Malaysia to officiate the opening ceremony.

Agri Malaysia is served as a major agriculture platform in Malaysia because of its large volume of international participants such as Malaysia, Australia, USA, Italy, China, Singapore, Korea, Taiwan, Vietnam and Sudan, providing a choice of 460 brands of products and technology for the attending visitors. This is one of the most anticipating and most comprehensive trade exhibitions in agriculture sector.

Visitors were presented with a total of 46 seminars and talks presented by local

and international speakers from Taiwan, Australia, Singapore and Malaysia. The topics covered the technique of crop planting, agricultural product processing technology, intelligent plant factory, farming and land management etc.

Visitors further explored the live operation of agricultural drone, high-pressure fertigation pump, towable wheelbarrow, mini dumper and Farm ATV at the designed outdoor live demonstration area.

The highlight for the 2018 event would be the real scene of IoT-based Smart Greenhouse. The smart greenhouse was equipped with complete automatic irrigation systems and professional farming machine and tools where visitors could experience and understand further on the application of IoT solutions in agriculture.

Agri Malaysia is a great platform for agriculture enthusiasts to learn and get great tips on what to expect during the application process, meet and network with agricultural and agro-based experts.

For more information, please logon www.agrimalaysia.com

EVENTS 2018-19

DECEMBER 2018

11-12

National Poultry Symposium on Health & Welfare

Rawalpindi, Pakistan

www.wpsa.com/index.php

19-21

ICABT 2018

Bangkok, Thailand

www.icabt.org

JANUARY 2019

22-23

Food Proteins Asia

Bangkok, Thailand

www.cmtevents.com

MARCH 2019

05-07

FSHOW 2019

Shanghai, China

www.en.fshow.org

11-13

6th Global Feed & Food Congress

Bangkok, Thailand

www.gffc2019.com

13-15

VIV Asia

Bangkok, Thailand

www.vivasia.nl

27-30

Poultry & Livestock Bangladesh

Dhaka, Bangladesh

www.cems-foodagro.com/poultrybd

April 2019

8-12

Asian Fisheries & Aquaculture Forum

Iloilo City, Philippines

www.12afaf.net

FOOD OUTLOOK

THE FAO FOOD Price Index (FFPI) averaged 163.5 points in October 2018, down 1.4 points from September and 13 points below its level in October 2017. The October 2018 decline was mainly due to the falling dairy, meat and oils prices.

The FAO Cereal Price Index averaged 166.3 points in October, marking a rebound of 2.2 points from September and representing a 13.6 point year-on-year increase. Maize quotations from the US firmed the most, while wheat prices also averaged higher, driven by a tighter supply outlook.

The FAO Vegetable Oil Price Index averaged 132.9 points in October, down two points month-on-month. The latest slide was mostly driven by lower price quotations of palm oil, reflecting persistent pressure from large inventories held by major exporting countries amid



sluggish global import demand.

The FAO Dairy Price Index averaged 181.8 points in October, down 9.2 points

from the previous month. This reflects the growing evidence of increased export supplies across all major dairy products, especially from New Zealand.

The FAO Meat Price Index averaged 161.6 points in October, down 3.3 points from September and 11 points below its value a year ago. After four months of continuous strength, ovine meat prices lessened, underpinned by the availability of new season supplies from Oceania. Bovine meat prices declined, while the current market sluggishness weighed on the prices of poultry meat.

The FAO Sugar Price Index averaged 175.4 points in October, up 14 points from September. This is attributed to negative production prospects in the major sugar producing regions, notably in India and Indonesia, mostly as a result of climate-related events.

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Preventing AMR misuse across Asia-Pacific biosphere

THE FOOD AND Agriculture Organisation of the United Nations (FAO), World Organisation for Animal Health (OIE) and World Health Organisation (WHO) have partnered to counter antimicrobial resistance (AMR) through the addition of the UN

Environment Programme (UN Environment).

The new partnership, to be known as the Tripartite Plus, was announced at the opening of the World Antibiotic Awareness Week (WAAW) observance in Asia and the Pacific.

WHO is focusing on food safety while OIE will be promoting prudent and responsible use of antimicrobials in animals. For FAO, the emphasis is on promoting good farming and biosecurity practices aimed at preventing infection in livestock, aquaculture, and crop production. The overall objective is to strengthen efforts to achieve many of the global sustainable development goals, particularly the goal of zero hunger, by 2030.

This year, in conjunction with WAAW, the Tripartite Plus revisits the global action plan (GAP) on AMR, which sets out responsibilities for national governments, WHO, FAO and OIE as well as for other national and international partners in responding to AMR. Promoting positive behavioural change remains one of the priorities in mitigating the spread of AMR. Strengthening policies and surveillance is crucial as well, stresses FAO.



Image credit: Neil Turner/Flickr

The move is intended to attack AMR in a more holistic way.

New tuna eco-labelling scheme in Southeast Asia

THE APPROVAL OF the ASEAN tuna eco-labelling (ATEL) policy by the ASEAN Ministry of Agriculture and Forestry has created opportunities in Southeast Asia's fisheries sector.

Fish and fishery products are among the most-traded agricultural and food commodities with more than one-third of production entering international trade in the Asia-Pacific region. Tuna is considered one of the most important species in the globe since its function as source of protein is very important for health.

ATEL aims to unlock new barriers for Asian fish producers to enter the international retail market of developed countries.

The joint committee on ASEAN cooperation in agriculture and forest products promotion scheme noted that the basic principle of ATEL is to find a balance between meeting the market demand for export to ASEAN tuna producers' ability to meet the requirements relating to environmental protection.

"Eco-labelling certification which had already existed considered creating new market barriers and excessive cost burden for businesses. Additionally ATEL certification can form a 'branding' for ASEAN tuna products," said the committee.

ATEL is expected to solve the problem of tuna fisheries in ASEAN. Beyond the existing eco-label mechanism in the Asia-Pacific region, ATEL is controlled by the government, more



Fishing boat unloading tuna.

Image credit: pavel1954/Adobe Stock

oriented to the integration of sustainable fisheries management in Southeast Asia and focuses on creating a regional branding for fisheries development. With this new move, Asian fisheries are set to explore immense opportunities and the region is projected to appear as one of the leading sectors for fish and fisheries development.

Better irrigation to improve agricultural output in Vietnam

THE ASIAN DEVELOPMENT Bank (ADB) has approved more than US\$100mn to help the government of Vietnam install eight modernised irrigation systems in five drought-affected provinces.

The initiative aims to improve agricultural productivity, especially among farmers growing high-value crops such as coffee, peppers, grapes, dragon fruits and mangoes.

ADB's support for the upgraded irrigation systems, which will supply water on-demand through pressurised pipe systems, also



ADB project is set to help install eight modernised irrigation systems in five drought-affected provinces in Vietnam. (Image credit: Kevin Dooley/Flickr)

covers policy measures to help the provinces of Binh Thuan, Dak Lak, Dak Nong, Khanh Hoa, and Ninh Thuan improve irrigation management services including the operations and maintenance of irrigation infrastructure.

"Modernised irrigation systems maximising the potential of Vietnam's agricultural sector are crucial to the country's goal of pursuing inclusive and sustainable growth," said Sanath Ranawana, senior natural resources economist at ADB.

"The project's focus on climate resilience, particularly by providing water on-demand to farmers, will help smallholder farmers increase crop yield and boost their incomes," Ranawana added.

Agriculture contributes 18.3 per cent of Vietnam's gross domestic product (GDP) and 44 per cent of the labour force from 2008–2016. However, despite having one of the best irrigation coverage in Southeast Asia, covering about 50 per cent of the country's arable land area, more than half of Vietnam's irrigation systems remain under capacity due to outdated infrastructure. This affects the productivity of farmers in drought-affected provinces in Vietnam, especially given the effects of climate change.

ADB's assistance is composed of a US\$100mn concessional loan and a US\$300,000 grant from the Climate Change Fund, established in May 2008 to facilitate greater investments in ADB's developing member countries to effectively tackle climate change.

ADB will administer another US\$750,000 grant from the Netherlands Trust Fund under the Water Financing Partnership Facility to improve access to water resources among people living in the project area. The grant is expected to support the development of water resource assessments and a water allocation framework, water productivity assessments and a crop water monitoring platform.

Unlocking the potential of Myanmar's inclusive growth



Image credit: Metsemakers1963/Adobe Stock

Aiming to develop a sustainable livestock, feed and agriculture industry, the expo creates a plethora of opportunities for companies with expansion plans in Southeast Asia.

ONE OF THE largest countries in Southeast Asia, Myanmar's economy largely depends on the livestock, feed and agricultural sectors. With a labour force of 18 million people, almost 70 per cent of the population in Myanmar are involved in the livestock, feed and agriculture industry.

As estimated, livestock breeding and the fishery sector contribute about 3.4 per cent of Myanmar's gross domestic product (GDP) and with a strong aim to increase this, Myanmar is opening the doors to the outside world to invest in the country's livestock, feed and agriculture. According to the International Monetary Fund (IMF), Myanmar's GDP is ready to accelerate significantly, due to the country's booming agricultural sector.

The backbone of Myanmar's economic revolution is supported by a number of initiatives by the Southeast Asian nation for the development of these sectors. Given its massive and abundant resources with excellent market positioning, the nation has large growth and major

investments to look forward to that would greatly increase their production capabilities in these sectors, as well as for agrochemicals.

In order to address the potentials of feed, livestock and agricultural sector in boosting the country's economy, AgriLivestock Myanmar, the leading international livestock, feed and agriculture exhibition and conference has been held at the Expo Hall, Yangon from 6-8 December 2018. This business-to-business platform provided major opportunities to build and expand businesses in the country.

Held concurrently with AgriFood Myanmar 2018, this event brought together more than 200 international and local companies and brands from countries including Malaysia, China, Taiwan and Thailand.

Latest technology, supplies and solutions

Organised by AMB Tarsus Exhibitions – the region's leading exhibition and conference organiser, more than 6,000 industry professionals in livestock, feed and agriculture industries provided in-depth knowledge on the latest innovations and advancements of new products and technologies in the sector.

AgriLivestock conference further discussed many challenges Myanmar is facing in modernising its livestock, feed and agriculture industry and the steps that can be taken to overcome them.

The vast range of exhibitor profiles include animal health, aqua, biotechnology, conveying equipments, crop processing machineries, cultivators, feed additives, feedmilling equipment, feed, fertilisers, hand tools, packaging and storage systems, plant protection, planning and harvesting machines, precision farming, science and research, seed, silos, sowing and planting machineries, sprayers, tillers and many more.

■ Livestock breeding and the fishery sector contribute 3.4 per cent of Myanmar's GDP."

Top exhibitors

AgriLivestock Myanmar 2018 secured support from many international companies who also participated at the three-day forum.

The US Grains Council, an organisation specialising in developing export markets for the US grain and cereal products, officially joined the expo as a participating exhibitor. The organisation joined more than 200 other exhibitors represented by Pavilions from China, Malaysia, India, Turkey, Taiwan, Singapore and Korea to leverage on the marketing platform provided by the exhibition to highlight their solutions for Myanmar's growing livestock sector.

Myanmar's Livestock Federation (MLF) signed a MoU agreement with the expo organiser. Global leading brands Van Aarsen, Ottevanger and PTN unveiled innovative machineries and solutions for Myanmar's livestock, feed and agriculture industry during the event. Singapore-based Stolz and Japan's Nabel showcased various technical solutions of high efficiency for the feed and grain industry and egg processing machines from washing, drying, grading to packing system.

Vinimex, global leader in manufacturing and trading of agricultural products and animal feed, exhibited their solutions in the

Livestock, feed and agriculture industry plays a role as the backbone of Myanmar's economy."



Image credit: T1studio/Adobe Stock

Proper ventilation system is crucial for egg farms.

industry. Korea's CheilJedang (CJ) Group featured a modern array of quality feed products at the expo, which include feed and additives, animal health and nutrition as well as animal rearing equipment.

Italy's FACCO introduced its poultry layer farm solutions such as prefabricated houses, ventilation, cooling and heating systems, manure removing drying systems, egg collection systems, full electronics for the farm automation and more.

In addition, the conference further featured international speakers from the world's leading companies presenting on the many challenges facing the industry and the steps that can be taken to overcome them. ■

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AGRICULTURAL SPRAYERS, BEING the most viable farm equipment to deliver agrochemicals at targeted locations, have emerged as essential crop protection equipment for effective production. According to MarketsandMarkets, a global market research firm, the market for agricultural sprayers, in terms of value, is estimated to be US\$1.86bn in 2017 and is projected to reach US\$2.63bn by 2022, at a CAGR of 7.12 per cent from 2017.

The growing technological advancements and extensive changes in farming and spraying technologies are some of the major factors fuelling the demand for this equipment. The market can be segmented into four parts such as manual, battery-operated, solar and fuel-operated.

Manual sprayers, including knapsack sprayers, backpack sprayers and foot-operated sprayers, are cheaper compared to battery and full-operated sprayers. These are useful in developing countries such as India, China, Mexico, etc, where landholdings are usually small.

Technological advancements in spraying equipment

In recent days, newest and cutting-edge technologies such as drones and driverless sprayers are providing significant opportunities for the growth of agricultural sprayers. A drone, with the latest technologies of various microscopic sensors such as global positioning system (GPS) modules, processors, accelerometers, digital radios etc, aims to help farmers with mid-field weed information.

With the help of GPS modules, geographic information systems (GIS) mapping and simulation modelling, drones help the farmers by providing the right amount of pesticides, fertilisers and herbicides, and dissemination of them for



Drones and driverless sprayers provide significant opportunities to spray fertiliser on the fields.

Image credit: kinwun/Adobe Stock

greater crop yield, especially in the regions where it is the most crucial, even in adverse conditions such as rain, fog, dust etc.

Asia-Pacific

According to MarketsandMarkets, the Asia Pacific region is projected to be the fastest-growing market for agricultural sprayers, mainly due to an increase in agricultural practices, use of advanced technological farm equipment and rapidly growing consumer markets of China, India, Australia and Japan.

"India is one of the fastest growing markets for agricultural sprayers in the Asia-Pacific region. The adoption rate of agricultural equipment in India is developing considerably. The population is also increasing rapidly, which creates a need for food in the Indian markets, which drives the market for agricultural sprayers," said the source.

On top of this, the growth has gained momentum as the Asia governments are promoting usage of advanced technology in agriculture. For example, Japan's Ministry of Agriculture has granted funds for applications of remote sensing in farming and the Indian government has also adopted a number of methods to speed-up technological usage to boost productivity. In addition to this, the agricultural companies in the Asia-Pacific

region are also investing heavily on R&D to introduce new technologies, resulting an improved food quality.

Post-harvest processing

The primary aim of post-harvest processing is to sustain the quality of crops, fruits and vegetables as high as possible as well as for a long period of time. Cleaning, sorting and grading, grain storage, dispatch and transportation are considered to be most important aspects that affect the quality maintenance of perishable produce.

The UN Food and Agricultural Organisation (FAO) said, "One of the most critical physiological factors in successful grain storage is the moisture content of the crop. High moisture content leads to storage problems because it encourages fungal and insect problems, respiration and germination."

"The storage of grains can also be affected by the atmosphere, in addition to temperature and moisture content. If damp grain is held in a sealed container, the respiration of grain and insects will consume the available oxygen. As the oxygen is depleted, it is replaced with carbon dioxide. This, in turn, inhibits the activity of the insects and fungal problems, which will decrease to the point that it virtually ceases," FAO added. ■

A better place to live in

Livestock rearing management involves the environment, housing and care, maintaining normal growth, good health and proper reproduction system, minimising the risk of injuries and disease outbreaks.

PROPER LIVESTOCK HOUSING and management design is vital for animal well-being, to improve the quality of animal research and production as well as safety of the animals and their stuffs. Appropriate animal rearing management takes care of the physical, physiological and behavioural needs, for normal growth, hygiene and breeding process.

The design and construction of housing and right environmental control for the species are considered two of the most important aspects to increase economic benefit in livestock husbandry and easier handling of the animals.

Housing requirements

According to *The National Academies of Sciences, Engineering and*



Image credit: DedMiyay/Adobe Stock

Modern concept of milking cows.

Medicine, livestock housing should be constructed with materials that balance the needs of the animal with the ability to provide for sanitation. They should have smooth, impervious surfaces with minimal ledges, angles, corners and overlapping surfaces so that accumulation of dirt, debris and moisture is reduced and satisfactory cleaning and disinfecting are possible.

“Housing should be constructed of durable materials that resist corrosion and withstand rough handling without chipping and





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cracking. Wooden items might need to be replaced periodically because of damage or difficulties with sanitation,” said *The National Academies of Sciences, Engineering and Medicine*.

Cattle, pig and poultry housing

Dairy cattle should be kept in a confined area, free from mud and manure, to reduce the chances of hoof infection. As the UN Food and Agricultural Organisation (FAO) said, “Concrete floors or pavements are ideal where the area per cow is limited. However, where ample space is available, an earth yard, properly sloped for good drainage, is adequate.”

“Pig houses should be simple, open-sided structures because maximum ventilation is needed. A building for open confinement is therefore essentially a roof carried on poles. For all types of confinement housing, a properly constructed, easily cleaned concrete floor is required,” said FAO.

Proper housing facilities for laying hens require environmental needs during the various stages of the chicken's life. The construction site should be designed in a way that can provide adequate ventilation and be protected from strong winds. Also, as poultry housing buildings tend to produce odours, they should be located well downwind of nearby dwellings, stressed FAO.



White chicken farm feed in indoor housing.

Image credit: chayakorn/Adobe Stock

Environment controls

Some of the basic climatic factors for livestock farming include temperature and humidity, ventilation, lighting, containment and air quality.

The National Academies of Sciences, Engineering and Medicine said that the factors that contribute to variation in temperature and humidity include housing material and construction, use of filter tops, number of animals per cage, forced

ventilation of the enclosures, frequency of bedding changes and bedding type.

Proper ventilation system supply adequate oxygen to the animal herds, remove thermal loads caused by animal respiration, dilute gaseous and particulate contaminants, adjust the moisture content of room air and create static-pressure differentials between adjoining spaces, wherever appropriate.

“Lighting should be diffused throughout an animal holding area and provide sufficient illumination for the well-being of the animals and to allow good housekeeping practices, adequate inspection of animals—including the bottom-most cages in racks—and safe working conditions for personnel,” explained *The National Academies of Sciences, Engineering and Medicine*. ■



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Black Sigatoka cuts 'big' banana down to size



*The unfurling heart leaf of the banana plant is most susceptible to infection by *Mycosphaerella fijiensis*.*

Image credit: Ricardo Reguera at Nordox

Black Sigatoka poses a serious threat to banana farming. Dr Terry Mabbett reports.

BANANA IS A big crop in every respect, grown in 135 countries throughout the tropics and sub tropics with world production currently standing at 144mn mt. Around 48mn mt are grown by the world's top three producers and all Asian countries – India (27.7mn mt), China (12mn mt) and Philippines (8.7mn mt).

Only 15 per cent of world production is exported which is perhaps surprising. However, most production comprises plantain and vegetable (both cooking) bananas, typically grown by smallholders as a staple crop for home consumption.

Yields are high with Cavendish dessert (fruit) bananas grow for export 'weighing in' at between 40 and 50 tonnes/ha/year. Areas over which these dessert bananas are grown are correspondingly large with individual estates or plantations commonly covering 2,500 ha to 5,000 ha of cultivated land.

Full-grown, fruit-bearing banana plants are big by other non-tree crop standards. Actual plant size varies depending on variety and growing conditions but most will attain around five metres in height.

Banana plant height ranges from 'Dwarf Cavendish' at around three metre to 'Gros Michel' dessert banana plants at seven metre or more. Leaves are spirally arranged and may grow up to 2.7 metres long and 60 cm wide.

Despite all-round size, banana meets its match in plant pathogens which have co-evolved with this monoculture crop over the last 75 years and 'cut it down to size.' Prominent in their pathogenicity and adaptability are a group of fungal pathogens causing a debilitating diseases of the leaves and commonly called 'Sigatoka,' coined in the 1920s after the name of a town on the island of Fiji in the Asia-Pacific region.

Two Ascomycete fungi *Mycosphaerella musicola* and *Mycosphaerella fijiensis* are causal pathogens of, respectively, yellow Sigatoka disease and black Sigatoka disease of banana. Yellow Sigatoka was first recorded in Java in 1902, then 10 years later in Fiji with severe losses in Australia in 1924. By late 1930s, the disease was widespread in Central America and the Caribbean Islands. Almost a century later yellow Sigatoka has all but disappeared as an economic disease of banana having been overtaken and ousted from all the main banana growing areas of the world by the much more aggressive (virulent) and damaging *M. fijiensis*. Black Sigatoka can reduce fruit bunch weight by as much as 50 per cent.

Black Sigatoka takes over

Black Sigatoka disease was first identified in 1963 on the island of Fiji and named as such for the dark brown or black streaks formed on the leaves although subsequent research showed *M. fijiensis* was widespread across the Pacific region long before discovery in 1963 on Fiji. This aggressive disease spread rapidly throughout Asia during the 1960s, into Africa and Central America by the early 1970s and South America by the early 1980s.

In true tropical climates, leaf spotting will appear eight to 10 days sooner (after infection) for black Sigatoka than for yellow Sigatoka. Where black Sigatoka appears yellow Sigatoka disappears within about three years. Black Sigatoka has set the agenda for fungicide application throughout the banana growing world.

First symptom of black Sigatoka appears on the lower (abaxial) leaf surface as a dark brown streak around 1-2mm long. Lesions increase in size and subsequently develop into dark brown to black advanced streaks up to five to 10mm long with an ill-defined border. Advanced streaks coalesce into so-called young spots with a dark brown to black centre surrounded by a yellow halo.

Streaks usually appear within 14-21 days of infection initially along the left hand margin (looked at from the base of the leaf to its tip) of leaves three and four, but also on leaf two (counting down from the youngest unfurled leaf) when conditions are particularly favourable for leaf infection.



Image credit: Ricardo Reguera at Nordox

Severe attacks by Black Sigatoka disease can reduce normal banana bunch weight by 50 per cent. An unaffected and healthy bunch of dessert banana is shown here.

The shape of these necrotic leaf spots varies from almost circular to oval but where mass infection occurs dead and dying leaf tissue assumes a greyish/white colouration which makes the outlines of individual streaks difficult to see.

The major infection site for both yellow and black Sigatoka is the unfurling heart leaf and first completely unfurled leaf but all leaves are essentially susceptible to the more aggressive black Sigatoka disease. The stage at which leaves are infected will determine the pattern of leaf spotting. This, in turn, is governed by the pattern of leaf unfurling and whether infection is by conidia (asexually produced spores) or ascospores (sexually produced spores), and the particular stage of leaf unfurling at the time of infection, as well as the rainfall patterns and the timing of fungicide application.

First symptom of black Sigatoka appears on the lower (abaxial) leaf surface as a dark brown streak around 1-2mm long."

Infection by *M. musicola* to cause yellow Sigatoka disease is by both conidia and ascospores the symptoms of which are distinguished as leaf-tip spotting and line spotting, respectively. Leaf spotting is more prevalent towards the apex of the leaf. Conidia of *M. musicola* are only dispersed by water. Water droplets loaded with conidia falling into the unfurling heart leaves cause distinct patterns of line spotting. These in turn are affected by the exact stage of leaf unfurling and the particular part of the unfurling leaf surface exposed to the spore laden water droplets.

The much fewer conidia produced by *M. fijiensis* are only dispersed by wind and therefore do not result in distinct infection



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patterns. However, heavy infection by ascospores of the unfurling heart leaf produces a distinct line of spotting along the left-hand edge of the leaf.

Management and control of black Sigatoka

Sigatoka is a classic debilitating disease causing rapid destruction of photosynthetic capacity with catastrophic reductions in bunch weight and quality. Under normal circumstances, plant breeding and selection of disease resistant genotypes would be the first course of control action, but genomics of the genus *Musa* (banana) are extremely complex.

As a general rule, desert bananas (AAA genome) are more susceptible than plantain bananas (AAB genome) and vegetable bananas (ABB genome) to yellow Sigatoka disease caused by *M. musicola*. However, all of these genotypes are essentially susceptible to severe damage from *M. fijiensis* (black Sigatoka) and therefore offer little scope for plant breeding to combat the disease in contemporary banana cultivation.

Fungicide spraying is the basis of Sigatoka control since the 1950's. Copper-based compounds were the first fungicides to be used in the 1950's with pioneering trials on the French West Indian islands of Martinique and Guadeloupe and Jamaica. Good spray coverage of tall banana plants was achieved using shoulder mounted (knapsack) mistblowers for small plots and aerial spraying for estates and plantations.

Copper-based chemicals are protectant fungicides. They remain on the foliar surface and as the name implies protect the leaf from infection, by killing fungal spores as they germinate. As such, good spray coverage and good retention of fungicide deposits, in the face of heavy tropical rainfall, are essential for control success. This can be achieved by suspending and spraying the copper fungicide in oil rather than water. Oil-based sprays spread more easily over the waxy banana leaves and enhance tenacity (sticking power) of fungicide deposits.

Rise and fall of systemic fungicides

The late 1960s saw fungicide spraying of banana set for radical change with development of first systemic fungicides (benzimidazoles) and a succession of new chemical groupings released onto the market ever since and notably the triazole fungicides. Unlike protectant fungicides, these novel, systemically acting chemicals can move across the leaf surface and into the leaves. And for transport in the water-conducting (xylem) and/or the food translocation tissue (phloem) to eradicate or at least suppress established infections and disease.



Ricardo Reguera at Nordox

Black Sigatoka develops rapidly and can completely destroy the photosynthetic capacity of the huge banana leaf in a short space of time

The use of systemic fungicides is part of a strategy to manage black Sigatoka, by killing fungal spores as they germinate.”

Complete spray coverage of banana leaves, though still important was suddenly less critical (than for protectant fungicides). What's more, these new fungicides were considerably more potent and targeted by possessing site specific action which hits and knocks out a specific enzyme in the fungal metabolism. This is in direct contrast to protectant copper fungicides such as cuprous oxide which exhibit broad-spectrum fungicide action, which knocks out a whole bank of enzymes in the fungal metabolism. It is achieved by the fungicidal divalent copper ion (Cu^{2+}) which denatures (destroys) the specific shapes of enzyme proteins.

Instead of revolutionising disease control, systemic fungicides were the architects of their own downfall, by selecting out pathogen biotypes (strains) which are not susceptible to their action. This subsequently causes the now well-established and commercially-feared phenomenon called 'fungicide resistance.'

Fungal reproduction rates are 'fast and furious' with genetic mutations frequently occurring in the 'millions' of spores thus produced. If just one of these mutations has the capacity to beat the mode of action of a specific fungicide molecule then a whole train of events is set in motion and eventually leading to the failure of that specific fungicide.

The systemic fungicide thus affected will continue to destroy all infections except those caused by the mutant strain which is 'immune' to its action. This leaves the mutant strain to multiply and generate a pathogen population which is completely resistant (immune to) the chemical mode of action of the fungicide – and all other fungicides in the same chemical grouping and with the same mode of action.

A renaissance for copper fungicides

Copper fungicides do not exert this type of selection pressure on pathogen populations because as broad-spectrum action fungicides they have the capacity to knock-out all enzymes in the fungal metabolism. So provided the active copper ions come into contact with the fungal spores on the leaf surface spores will be killed irrespective genetic make-up.

Frequent applications of high fungicide rates (doses) encourage the development of fungicide resistance in the pathogen population. As such crops like banana widely grown on a large scale and intensively sprayed against disease are most at risk. And this is precisely what has happened with black Sigatoka which is now resistant to a whole range of systemic, site-specific action fungicides applied to banana on a large scale and over a long period of time.

The consequence is a renaissance for copper fungicides. Scientists advise banana growers to rotate systemic fungicides so that fungicides with the same chemistry and therefore mode of action are not used consecutively. And to incorporate protectant fungicides such as cuprous oxide into the treatment schedule. The protectant, broad-spectrum acting copper fungicide (e.g. cuprous oxide) will provide 'cover' against development of pathogen resistance to systemically acting, site-specific action fungicides. ■

Commercial poultry producers must address the flock health and hygiene to increase quality production.

Image credit: WONG SZE FEI/Adobe Stock

Essentials of a healthy flock

Due to the tremendous growth in global poultry sector in last few decades, a number of regions have reported a dramatic increase in infectious disease outbreaks. To address this, commercial poultry producers must ensure continuous surveillance to retain consumer confidence in poultry products.

WITH THE CONSUMPTION of poultry greatly increasing in recent years across the Asia-Pacific and worldwide, maintaining correct sanitation procedure at all stages of commercial poultry production becomes highly important. An effective management of health and disease control in the poultry houses remains a crucial priority area as both the poultry farmers and the technical specialists spend a great amount of time in monitoring flocks' hygiene during the time of production.

Therefore, maintaining a continuous vigilance to keep consumer confidence in poultry products by implementing the highest safety standards during poultry production is of paramount importance. It is both to ensure the food safety, being the major concern among consumers, and to protect people from some of the zoonotic diseases that can be transmitted from poultry.

Common infectious diseases

Mainly four types of diseases can be seen to affect poultry during commercial production. These include nutritional diseases, caused by inadequate nutrition or

utilisation of spoiled nutritive (For example: Fatty Liver Syndrome, Perosis, Rickets); viral diseases such as avian encephalomyelitis, avian influenza, avian tuberculosis, chicken anaemia virus infection (CAV), Marek's Disease, Newcastle Disease (NDB), salmonellosis, etc; parasitic diseases including coccidiosis, cryptosporidiosis, histomoniasis, Lice and Mites, etc; and behavioural diseases such as cannibalism.

Essentials of poultry hygiene - Biosecurity

There are a number of aspects of poultry husbandry that impact the health and hygiene. These include feed, environment, genetics, vaccination, medications, nutrition, sanitation and biosecurity in disease prevention.

Addressing these, the commercial poultry producers must enforce a comprehensive biosecurity method to sustain an effective immune system that requires constant and close attention, the failure of which will result in an unhealthy flock.

Biosecurity is the efficient use of common sense hygiene procedures in

preventing the adverse effects of a disease. It can be defined as a set of management practices which, when followed, reduce the potential for the introduction or spread of disease agents onto and among site.

In a paper written by Gary D Butcher from the University of Florida, it is stressed that effectual biosecurity practices control disease outbreaks and improve the production rate in a significant way. It further determines the stability of poultry disease organisms in the environment, breakdown in disease outbreak and ensures a sustainable poultry health management. Therefore, a biosecurity plan must be adapted for each operation because each operation usually has its own

Storage safety

- Raw feed ingredients to be cleaned regularly and kept in waterproof silos
- Dust control is essential for managing diseases such as salmonella in feed mills
- Periodical surveillance to ensure quality control programme in the mill design
- Remove rodents, wild birds and all nesting materials from the mill

unique situations.

According to the study, an inadequate biosecurity measure can increase the risk of infectious bursal disease (IBD) and Marek's disease. NDB, which emerges as a critical problem in many parts of the world, requires a solid biosecurity practices, apart from the vaccination programme.

Prevention and management

An early diagnosis of disease is very important to start the early treatment and prevention process. The latest developments on the basics of commercial poultry health and hygiene management include:

Quarantine: Detention of diseased flocks to prevent the onset of disease

Hygiene: Demolition of destructive organisms as much as possible

Vaccination: Protecting the chicks against very serious diseases

Medication: Using right preventive medication, mainly for diseases where vaccines are of a little or no use

Supervision: Implementing a proper monitoring system for chicken flock

Principles of poultry health

- Avoid overfeeding to prevent breast blisters in the birds
- Do not keep laying hens in production for more than one year to prevent avian tuberculosis (TB)
- Remove wet bedding and keep them clean to prevent arthritis
- Add vitamin D3 to water to control osteoporosis
- Transfer culled birds and carcasses quickly to avoid contamination at the barn



Image credit: Budimir Jevtic/Adobe Stock

behaviour to provide early warning of infection.

Use of vaccination

Certain flock diseases such as Marek's Disease, NDB, Infectious Bronchitis, Infectious Bursal Disease (IBD; Gumboro), Avian Encephalomyelitis (AE), etc, are highly widespread in nature and require regular vaccination programme to be eradicated. Proper vaccination can be used in triggering the immunity system to produce antibodies to fight infection.

While explaining to the *Poultry Health Today* on the role of broiler vaccination to protect them against chicken anemia virus (CAV), Guillermo Zavala, DVM, PhD, Avian Health International, LLC, said that without vaccination, breeders may not have enough CAV antibodies to protect offspring during the first critical two weeks of life when chicks are very susceptible to clinical infection.


CAV highly impacts on the immune system of the birds, specifically affecting

bone marrow cells and stem cells in bone marrow produce T-cells, thus causing several disease outbreaks such as coccidiosis, infectious laryngotracheitis and fowl pox virus.

Speaking to the source, Kalen Cookson, DVM, director of clinical research, stressed on the role of broiler vaccination against salmonella to reduce the prevalence of pathogen at processing, minimise salmonella colonisation and increase the bird performance.

The vaccination experts consider a number of things such as disease exposures expected, maternal immunities, types of vaccine available, administration routes, be it spray /occulonasal drops, drinking water, wing web, foot web etc, meaning that no one programme can be implemented to all flocks and situations.


That being so, poultry farmers are highly recommended to always consult with the local veterinarians before implementing the vaccination programme best for the case. ■



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Towards the future of food engineering



Asia's No 1 international trade show from feed to food returns in March 2019

FOOD MANUFACTURERS ALONG with primary producers and processors of animal proteins are being invited to register to attend VIV Asia 2019, from 13-15 March 2019, covering all species and sectors of the animal protein value chain.

More than 1,250 exhibitors are all set to attend the event at BITEC exhibition centre in Bangkok, Thailand.

A truly international and upbeat show

VIV Asia is held biennially, meaning its most recent appearance was in 2017. That edition took the show into a new league of global platforms in terms of event size and reach. Its certified final figures confirmed a new record total of 45,952 visits from 127 countries, revealing a nearly 20 per cent rise in attendance compared with 2015.

"We expect more than 50,000 visits in March 2019," event manager Zhenja Antochin declared. "Past editions have achieved the highest approval ratings from visitors and exhibitors of any event organised by VIV worldwide. We are determined that the March 2019 show will confirm that degree of value and satisfaction for everyone concerned and the key role we play in serving industry leaders from all parts of Asia and beyond."

"The pre-show promotion campaigns for VIV Asia 2019 are targeting a number of key countries in the wider Asia-Pacific region including China, India, Pakistan, Bangladesh, Japan and of course Thailand. We are organising important delegations from each of these countries and others as well, representing their most forward-thinking businesses active in the sectors of meat, eggs, milk and aquaculture."

Multi-species appeal

"The fact that VIV Asia is truly a multi-species show leaps out from

the long list of companies who will be on its stands in March," said Panadda Kongma, Thailand-based project manager of VIV Asia. "Farm production and the enhanced focus on food engineering involve more exhibitors this time. At the last edition up to 20 per cent of companies exhibited on farm production themes. The proportion is higher in 2019 mainly because there will be a larger selection of suppliers dedicated to pork production. And whereas the processing section of 2017 contained around six per cent of all exhibitors, the new Food Engineering feature is set to contain 10 per cent of companies and occupy double the former space."

"Of all the sections of the show, those relating to feed and animal health products are most typical of the multi-species approach, with products and services of high interest for every species. These sections held 60 per cent of exhibiting companies at VIV Asia 2017 and are ready to do at least the same in 2019. In fact, the demand for stands in those areas has out-stripped the space available," Kongma added.

"The overall data from 2017 underlined the multi-species profile of VIV Asia when they referred to the animal protein sectors in which visitors were mainly involved. Given the importance of pork, milk and aquaculture in the Asian market, we see clear opportunities for increasing the attendance from each of those industries."

Enhanced food engineering

Antochin takes up the story about food engineering by explaining that the section will present the products and services of more than 100 global suppliers, for the complete post-farm chain from slaughtering and processing to logistics, refrigeration, food ingredients and packaging.

"The whole business of food engineering has become so important in Asia, we recognised that it had to become a vital part of the VIV Asia spectrum," he remarked. "Primary and secondary processing are central aspects of it, of course, but the ideas and information that food engineering will offer across every bit of the journey from farm to consumer are meant to provide food manufacturers and retailers with a strong and valuable platform dedicated to this sector's developments in Asia."

"As with all the main sections of the exhibition, Food Engineering is going to be supported by a practical and thought-provoking conference programme that is open free of charge to all our registered visitors. It is another argument for pre-registering to come to VIV Asia 2019, because that way you will be among the first people to discover full details of the timing, topics and speakers lined up for the conferences to be held at the same BITEC venue as the show."

Registration

Visitors who pre-register at www.viv.net can print out a bar-code form or have it on their smartphone, enabling their entry badge to be shortly when they arrive. In addition, pre-registration allow the visitors to be fully informed about the forthcoming show's attractions, making all logistical information available for a fruitful visit. ■



Image credit: okrasjuk/Adobe Stock

Food engineering will get enhanced focus at VIV Asia 2019

Case IH unveils new JXT tractor models in Bangladesh

CASE IH, A brand of CNH Industrial, has unveiled the new JXT50 and JXT70 all-purpose tractors to the Bangladeshi market, extending its JXT tractor family, which now includes five models such as the existing 55 hp, 45 hp and 39 hp JXT tractors, plus the two new ones with 50 hp and 70 hp.

The launch event was held at the International Convention City Bashundhara, during the Agro Bangladesh 2018.

Case IH's all-purpose JXT Series tractors are offered by Abedin Equipment Limited, part of QA Group and Case IH authorised distributor in Bangladesh since 2013, which supports farmers through its network of 12 branches across the country.

Speaking about the launch of the tractors in Bangladeshi market, Ashok Anantharaman, director of marketing and sales at CNH Industrial, stated, "The JXT tractors have earned a well-deserved reputation among farmers who look for highly versatile machines that provide an affordable transition to mechanised production methods."

"The new JXT50 and JXT70 are true workhorses that can handle with ease a variety of implements, bringing Bangladeshi farmers a big performance with exceptionally low operating costs," he added.

The Case IH JXT Series tractors can be used as utility tractors in any farming business. Combined with high-capacity power, speed and lift and pulling strength, these tractors focus on maintaining



Image credit: Case IH

The two new all-purpose tractors in their 50 hp and 70 hp versions make their debut at the Agro Bangladesh 2018.

high fuel efficiency. The new JXT50 and JXT70 tractors are available in Bangladesh in 2WD or 4WD configuration and all features a 'Roll-Over Protection System' (ROPS) to protect equipment operators in the event of a vehicle overturn or rollover.

With the addition of the two models, the company is seen to meet the growing needs of the farmers in the country, by contributing to the demand of fast-developing mechanisation for Bangladesh's agriculture and economy.

New Holland's CR Revelation combine range takes automation to a new level

NEW HOLLAND HAS introduced new CR Revelation combine range with the IntelliSense system automation system, aiming to maximise throughput, minimise losses and reduce damaged grain.

Lars Skjoldager Sørensen, head of harvesting product line, said that the CR Revelation combine is set to significantly cut the harvesting costs through reduced losses and best-in-class grain sample.

"It has made a significant step forward in automation, taking over decision making from the driver to optimise output, grain quality and operator comfort," Sørensen added.

The CR Revelation combines feature New Holland's IntelliSense pro-active and automatic combine setting system, which takes automation to a new level to address a combine operator's big challenge of maintaining maximum throughput while keeping losses and damaged grain to a minimum.

This feature, winner of the Silver Medal at the Agritechnica Innovation Award 2017, aims to deliver significant advantages to the customers' productivity including increased daily output,

reduced grain loss and improved grain quality. It also introduces important benefits for the operator: fewer decisions to take, better comfort and driver confidence, less fatigue and a simple user interface.

With IntelliSense, the operator can choose from four strategies such as limited loss, best grain quality, maximum capacity and fixed throughput.

The patented cleaning shoe sensors provide very precise measurements of the load and based on this data the combine will proactively constantly adapt Twin Rotor speed and vane angle, fan speed and the opening of pre-sieve, upper and lower sieve to automatically deliver the desired result.

The patented automatic rotor vane adjustment improves the rotor's power efficiency without impacting the threshing and separation settings, resulting in greater fuel savings and performance.

CR Revelation expands range with new CR7.80

New Holland extends its CR Revelation range with a new entry level model, the CR7.80, powered by the Cursor 9 Common Rail engine with 265 kW (360hp) rated power and 295 kW (401 hp) maximum power. The new model features a cleaning shoe with single return. With a 750-litre fuel tank, a 9,500-litre grain tank and a high unloading speed of 126 litres/second, it delivers a highly efficient performance.

The new CR Revelation also features a new ground drive with a two-speed gearbox, integrated wet brakes, a bigger hydrostatic pump and electrohydraulic differential lock operation. The gearbox offers two speed ranges – one for field work, from 0 to 17 kph and one for road travel from zero to the maximum speed, which is set at the factory according to local regulations in each market. Maximum speed is reached at reduced rpm, resulting in lower fuel consumption.



Image credit: New Holland

New Ground Drive with two-speed gearbox delivers more traction and faster reaction.

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2018

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Section Two - List of suppliers

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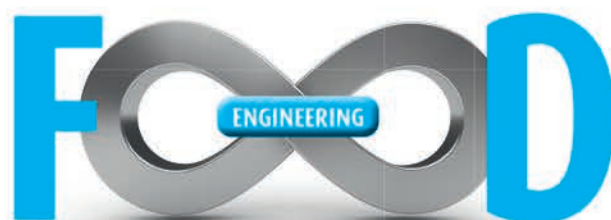
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