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African Farming and Food Processing

September/October 2017

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Improved yields
with innovations in combine harvesters

Fall army worm
Major breakthrough in pest control

Protectant fungicides
to keep away downy mildew

Agritechnica 2017 to boost machinery sales, p10

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The latest version of New Holland's CR10.90 model has a 700hp engine, making it the most powerful combine currently available. (Photo: New Holland)

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African Farming and Food Processing

Editor: Vani Venugopal

Editorial and Design team: Prashant AP, Hiriyti Bairu, Miriam Brtkova, Kestell Duxbury, Ranganath GS, Deblina Roy, Rhonita Patnaik, Samantha Payne, Rahul Puthenveedu, Nicky Valsamakis, and Louise Waters

Managing Editor: Georgia Lewis

Publisher: Nick Fordham

Sales Director: Michael Ferridge

Magazine Manager: Richard Rozelaar
Tel: +44 207 834 7676
Email: richard.rozelaar@alaincharles.com

Country	Representative	Telephone	Fax	Email
India	Tanmay Mishra	+91 80 65700911		tanmay.mishra@alaincharles.com
Nigeria	Bola Olowo	+234 8034349299		bola.olowo@alaincharles.com
South Africa	Annabel Marx	+27 218519017	+27 46 624 5931	annabel.marx@alaincharles.com
UAE	Graham Brown	+971 4 4489260	+971 4 4489261	graham.brown@alaincharles.com
USA	Michael Tomashefsky	+1 203 226 2882	+1 203 226 7447	michael.tomashefsky@alaincharles.com

Head Office:
Alain Charles Publishing Ltd
University House
11-13 Lower Grosvenor Place
London SW1W 0EX, United Kingdom
Telephone: +44 (0) 20 7834 7676
Fax: +44 (0) 20 7973 0076
E-mail: post@alaincharles.com

Middle East Regional Office:
Alain Charles Middle East FZ-LLC
Office L2-112, Loft Office 2,
Entrance B, PO Box 502207
Dubai Media City, UAE
Telephone: +971 4 448 9260
Fax: +971 4 448 9261
E-mail: post@alaincharles.com

Production: Naveenkumar H, Kavya J and Nelly Mendes
Email: production@alaincharles.com

Subscriptions: circulation@alaincharles.com

Chairman: Derek Fordham

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Farming Calendar 2017

OCTOBER

10-11	3rd Cassava World Africa *www.cmtevents.com*	LUSAKA
13-15	Agro & Poultry East Africa Nairobi *www.mxmexhibitions.com*	NAIROBI
21-22	Agra Innovate West Africa www.*lifesciences.knect365.com/agra-innovate*	LAGOS
23-24	RAIN 2017 *www.k2africa.com/events/rejuvenating-agriculture-in-nigeria*	ABUJA
24-25	Aviana Uganda 2017 *www.avianaafrica.com*	LUGOGO

NOVEMBER

02-04	Value Added Agriculture Expo, West Africa *www.reedexpoafrica.co.za*	ACCRA
12-18	AGRITECHNICA *www.agritechnica.com*	HANOVER
29-30	Agribusiness Congress East Africa *www.agri-eastafrica.com*	KAMPALA

DECEMBER

08-11	Addis Agrofood *www.addis-agrofood.com*	ADDIS ABABA

Readers should verify dates and location with sponsoring organisations, as this information is sometimes subject to change.

Focus on East Africa's burgeoning agri industry

LEADING REGIONAL FARMING event Agribusiness Congress East Africa returns to Kampala from 29-30 November as a fully-fledged conference and outdoor exhibition with its move to the National Crops Resources Research Institute (NaCRRI) in Namulonge.

Apart from the high-level conference with expert speakers, the event this year will also feature more than 45 exhibitors, free training workshops and agronomy consultations, roundtable discussions as well as live demonstrations and crop trials.

"The fast growth of the Agribusiness Congress East Africa, this year evolving into an outdoor expo, reflects the burgeoning agri industry and the high regional expectations for East Africa to become the continent's agricultural hub," said event director Yolanda dos Santos.

"The East African market represents 145.5 million consumers and its agriculture market is valued at more than US$147bn. However, the region's agri sector is not developing fast enough to meet market demands due to the lack of commercialisation, mechanisation, and access to information. For the fifth time this year, Agribusiness Congress East Africa will gather all the stakeholders in the sector, from farmers, agri experts, industry bodies, government and local and global suppliers and service providers, to make sure the region is equipping itself to play a leading role," she added.

The year the show will partner with the National Crops Resources Research Institute (in Namulonge and the Grain Council of Uganda (TGCU) is the official host partner of the event. The chairman of the TGCU, Chris Kaijuka, said, "For us to truly grasp the opportunity for East Africa, which has evolved into the new frontier for food and grain production and the continent's food basket, we need to come together and take action to move the industry forward."

Lusaka to host 3rd Cassava World Africa

TURNING A TRADITIONAL crop like Cassava into industrial carbohydrates for food and non-food applications is the ambition of many African countries. For many years, commercial cassava cultivation in Africa has been limited but this is changing.

Governments across Africa are pushing for the expansions of cassava investments and value addition that can potentially create more employment and economic development for the countries.

CMT's 3rd Cassava World Africa, to be held in Lusaka on 10-11 October 2017, aims to address the looming issues around cassava cultivation. Cassava World Africa has established itself as the preferred conference with commercial interests for cassava industry players across Africa. The event will see projects players in West and East Africa share their experiences, challenges, and opportunities with the common goal of maximising cassava value added products.

The show will be inaugurated by Dora Siliya, MP, Ministry of Agriculture, Zambia, who will deliver the opening address. The summit will feature key speakers addressing Zambia's initiatives to boost cassava cultivation as well as development of value added products. Zambia National Cassava Association (ZANACA) will explore the opportunities and challenges in commercialisation of smallholder cassava production in Mozambique and Zambia. A case study of launching cassava beer from scratch will be shared by Zambian Breweries during a session on 'Processing and brewing cassava beer'. Zambia National Commercial Bank (ZANACO) will join a panel discussion on 'Financing cassava projects and downstream investments.'

The event will look at cassava's potential in revitalising African economies. (Photo: Mircea Dobre/ Adobe Stock)

The other notable speakers are from Tanzania Private Sector Foundation (TPSF), Union Dicon Salt, Flour Mills of Nigeria, Citizens Economic Empowerment Commission, Commoditia, Uganda's Ministry of Agriculture, Animal Industry and Fisheries, International Institute of Tropical Agriculture (IITA), Context Global Development, Psaltry International, The Rockefeller Foundation, Praj Industries, Nine Stars Integrated Services, Enviplast, CNH Industrial South Africa, Tanzania Agriculture Export Process Zone, Context Global Development and Cassava Road Holdings.

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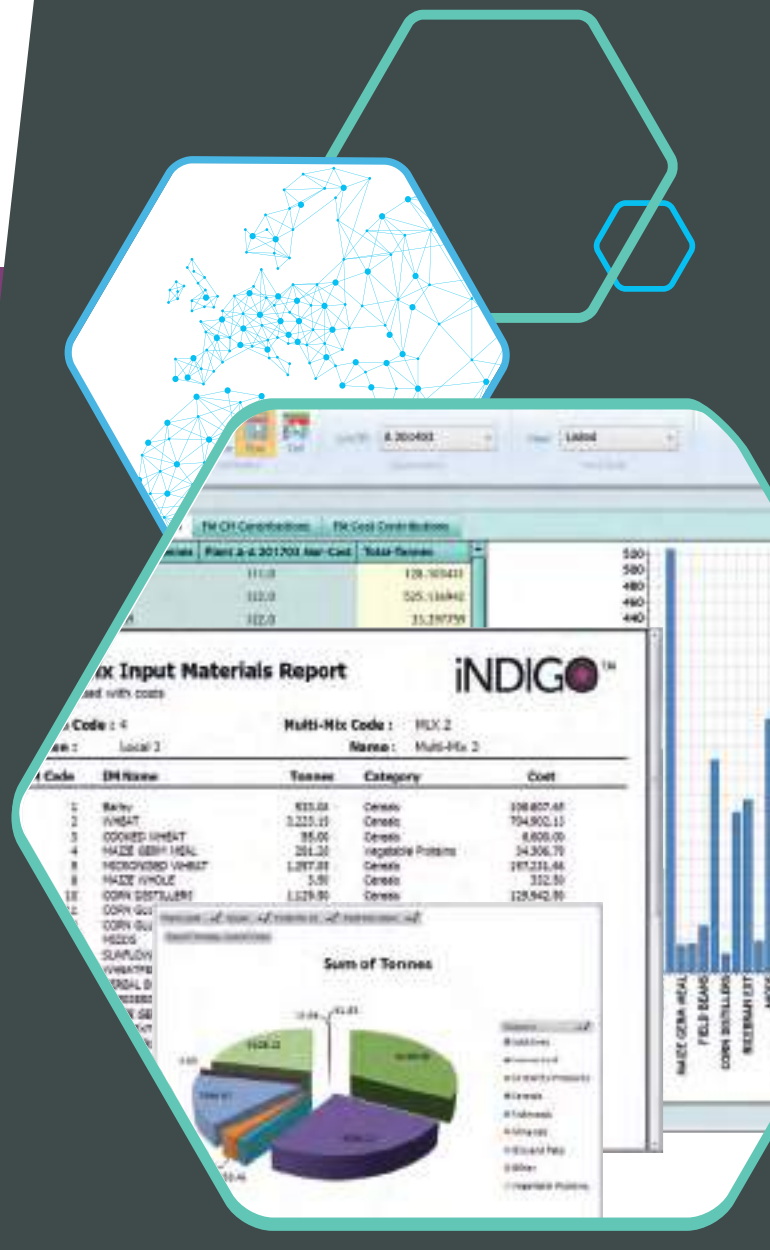

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Researchers model ways to control deadly maize disease

RESEARCHERS HAVE USED mathematical modelling to develop techniques to combat two co-infecting viruses causing maize lethal necrosis (MLN) in Kenya. According to researchers who conducted the new study, because maize is a staple crop in sub-Saharan Africa, the spread of MLN is threatening food security in the region.

Nik Cunniffe, co-author and lecturer in mathematical biology at University of Cambridge, said that the study's objective was to test whether mathematical modelling could be used to make practical recommendations for disease control.

"This is important since MLN is a big problem, causing up to 90 per cent yield loss in heavily infected areas," Cunniffe told SciDev.Net, adding that MLN has been spreading in Kenya for the last six years, and has also been detected in Ethiopia, Rwanda and Tanzania.

MLN usually arises from the interaction of two viruses: maize chlorotic mottle virus (MSMV) and sugarcane mosaic virus (SCMV).

White Guinea yam's genome sequence identified

RESEARCHERS HAVE DECIPHERED the complete sequence of one of the major food crops in Africa – the white Guinea yam. Yam is a major food source in the tropics providing food and income for some 60mn people.

Despite its importance, relatively little is known about the white Guinea yam (Dioscorea rotundata Poir), the dominant African yam, at the genetic level. Unlike other staple crops such as wheat and rice, the white Guinea yam is not widely cultivated, leading to its branding as an 'orphan crop.'

"The more we understand about the white Guinea yam, the better we will be able to help improve the crop, and help maintain this integral source of nutrition and income in a region undergoing the world's most rapid population explosion–especially as the demand for yam is currently overwhelming–much more than what we are able to supply," said Dr Robert Asiedu, director for West Africa, International Institute of Tropical Agriculture (IITA) and yam breeder for about 20 years.

Kenya to tap Chinese market to boost its flower exports

KENYA'S FLOWER INDUSTRY has tapped into the growing Chinese market in order to boost earnings of the sector, as part of the country's effort to diversify its markets of exporting.

The expanding Chinese economy has created demand for high quality flowers, Kenya Flower Council (KFC) CEO Jane Ngige told Xinhua.

"Chinese consumers are willing to pay a premium price for high quality flowers. We, therefore, want to tap into the high value flower segment of Chinese market in order enhance our farmers earnings," Ngige said, adding that to meet the demand, the industry is seeking to move up the flower value chain amid rising costs of production.

Most of Kenyan flower exports reach the Asian nation via the Netherlands-based flower auctions.

According to Ngige, the Kenyan flowers can be competitive in the Chinese market due to factors including the presence of direct air links between the two countries, though logistics remains a challenge for businesses due to the need to balance inward and outward cargo.

According to Kenya's Ministry of Agriculture, the flower sector earned the country about US$690mn in 2016, making it one of the leading sources of foreign exchange. (Photo: USAID)

"The flower sector is holding discussions with airlines to come up with best arrangement that will ensure maximum revenue," Ngige said.

Kenya flower industry is producing a relatively stable volume in recent years. Last year, the East African nation exported approximately 133,000 tonnes of flowers.

According to Kenya's Ministry of Agriculture, the flower sector earned the country about US$690mn in 2016, making it one of the leading sources of foreign exchange.

"Kenya produces world class flowers that compete globally due to its geographic location along the equator that has sunshine throughout the year as well as favourable soils," she said.

Ngige added that increased sales to China will help the industry diversify its export markets. "Currently, the industry is very vulnerable as most of its produce is sold to a single economic bloc," she added.

There is also an urgent need for Kenya to find new markets due to increasing competition in the flower business, noting that Kenya's success in the flower industry has motivated other African nations to enter into the sector.

"In the past decade, we have seen the emergence of Ethiopia, Rwanda and Tanzania as flower exporters," Ngige revealed.

AfDB pioneers major strategy shift in Africa's agriculture financing, invests US$774mn

THE AFRICAN DEVELOPMENT Bank (AfDB) has deepened agriculture with an initial investment of US$774mn in six countries in Africa to ignite economic growth and make agriculture an attractive investment.

Chiji Ojukwu, director of agriculture and agro-industry department at the AfDB, said that the bank's ENABLE (Empowering Novel Agri-Business-Led Employment) Youth Programme, part of its Feed Africa initiative, is making steady progress in changing the way agriculture is perceived – from a traditional way of life, to a lucrative investment.

Through the programme, which aims to produce some 300,000 agribusinesses and create jobs for 1.5mn youth in just five years, the bank set itself an ambitious target of nurturing a young pool of future agricultural millionaires in order to solve Africa's population growth challenge.

The bank estimates 100mn young Africans would be entering the job market within 10 years. AfDB estimates also show a substantial number of the youth currently live in rural areas, where demand for new labourers could continue to absorb the new job-market entrants.

To respond to the job-creation challenge, the bank's Jobs for Youth Strategy lays emphasis on a series of key agricultural sector reforms, aiming to make land more readily available. It also focuses its approach on improving the capacity of local farmers and producers and creating an enabling field for food processing.

AfDB's chief financial economist and the coordinator of the ENABLE Youth Programme, Edson Mpyisi, said battling a mindset change and beginning to view agriculture as a serious field, much different from holding the hoe, but building an industrial chain, still remains a challenge to overcome.

New app diagnoses crop diseases and alerts rural farmers

A TEAM UNDER the CGIAR Research Program on Roots, Tubers and Bananas (RTB) has developed an app that diagnose diseases in the field and through SMS services, sends alerts to thousands of rural farmers.

"Smartphones are becoming more and more common in rural Africa. Smallholders or extension officers with a basic smartphone with a camera will be able to download the app for free, fire it up, point it at a leaf with disease symptoms and get an instant diagnosis," explained Dr James Legg of the International Institute of Topical Agriculture (IITA), who leads the project together with Dr. David Hughes of Penn State.

The app will also provide the latest management advice for all major diseases and pests of root, tuber and banana crops, and pinpoint the location of the nearest agricultural extension support for farmers.

The team were recently awarded a $US100,000 grant as part of the CGIAR Platform for Big Data in Agriculture Inspire Challenges at the Big Data in Agriculture Convention 2017. The grant will allow the researchers to expand the app for other root, tuber and banana crops that are critical sources of food, nutrition and income security for millions.

Development of the app involved painstaking field work using cameras, spectrophotometers and drones at RTB cassava field sites in coastal Tanzania and on farms in western Kenya, which generated more than 200,000 images of diseased crops to train artificial intelligence (AI) algorithms. Using these images, Hughes, Legg and collaborators developed an AI algorithm that can automatically classify five cassava diseases, and by collaborating with Google, the team were able to develop their smartphone app with TensorFlow. It is currently being field-tested in Tanzania.

The app is currently being field tested in Tanzania. (Photo: IITA)

Penn State has also developed a mobile spectrophotometer through a start-up called CROPTIX. Early results suggest it can accurately diagnose different viral diseases in the field, even if the plant looks healthy.

"The app employs AI in real time so the farmer can be an active participant in disease diagnosis and crop health management, leading to more yields for smallholder farmers," added Dr Hughes.

The project team has developed linkages with the Vodafone agriculture SMS platform called DigiFarm, which will allow them to link digital diagnostics to large-scale rural text messaging services. The team will deliver farmer tailored SMS alerts on crop diseases and pests to 350,000 Kenyan farmers by July 2018.

DowDuPont merger completed

DOWDUPONT HAS ANNOUNCED the successful completion of the merger of equals between the Dow Chemical Company and El du Pont de Nemours and Company (DuPont). The combined entity will operating as a holding company under the name DowDuPont with three divisions – agriculture, materials science and specialty products.

"Today marks a significant milestone in the storied histories of our two companies," said Andrew Liveris, executive chairman of DowDuPont. "We are extremely excited to complete this transformational merger and move forward to create three intended industry-leading, independent, publicly traded companies. While our collective heritage and strength are impressive, the true value of this merger lies in the intended creation of three industry powerhouses that will define their markets and drive growth for the benefit of all stakeholders. "

US$1.5bn fertiliser plant inaugurated in Nigeria

NIGERIAN ACTING PRESIDENT Yemi Osinbajo has inaugurated a giant world-class fertiliser plant, built by Indorama (www.Indorama.com) Eleme Fertiliser and Chemicals Limited at the cost of US$1.5bn. The plant has a production capacity of 4000 mt of nitrogenous fertilisers per day or 1.5 mt per annum. The world-scale plant is funded by the International Finance Corporation (IFC) and a Consortium of 15 European and African banks and Financial Institutions through foreign direct investment.

Osinbajo commended Indorama for keying into the presidential fertiliser initiative which President Buhari launched last year to make fertilizers cheaper nationwide. "What Indorama is accomplishing today is very much in line with President Buhari's vision for a country that produces what it consumes and grows what it eats," he said at the ceremony.

Tool to provide Ethiopian livestock farmers better access to animal feed

KNOWING THE AVAILABLE feeds resources and how to manage them efficiently in complex and rapidly changing livestock production environments, can help address the many challenges faced by livestock farmers.

Identifying the access to adequate animal feeds as a significant challenge for livestock farmers in Ethiopia, the programme is working towards developing a 'FeedBase' tool. FeedBase is a feed balance sheet that is used to match up available feeds that are needed to support the livestock population in a production system. The database lists feed resource availability and feed requirements in a particular district or region using crop production statistics and land use data to calculate the feed availability from district to national levels. Livestock census data is used to estimate feed demand. Policymakers, planners, agricultural extension officers, researchers and feed producers can then use this information to make appropriate decisions in allocating animal feed resources.

Carl Birkelo, chief of party and technical advisor at ACDI-VOCA, pointed out that while livestock is an integral part of the livelihoods of a large portion of country's population, productivity is low because of feed constraints. According to Birkelo, using the FeedBase tool will lead to better management of feed resources to match the livestock needs in specific regions and it will help identify new opportunities for improving feed productivity.

Animut Getachew, senior technical expert in the livestock program at ATA said that the tool will also enable the design of appropriate interventions to systematically allocate feed resources, show the opportunities for scalable commercial aggregation and value addition of surplus feed for trade that can be used in feed deficit areas.

As a departure from the original FeedBase concept, Michael Blümmel, deputy program leader of the Feed and Forage

Access to feed is a major challenge faced by livestock farmers in Africa. (Photo: Blair/Adobe Stock)

Development program at ILRI pointed out that the tool developed for Ethiopia will have interactive features that will allow users to test and prioritise possible feed and animal interventions. The tool will also be generic, in that its framework and architecture can be used in different countries for the development of country-specific feed supply demand scenarios.

Tools and approaches for estimating feed supply and demand in sufficiently disaggregated forms can enable realistic assessments of achievable productivity gains and greater economic benefits from livestock value chain interventions. These feed supply and demand estimates can also provide market intelligence to decentralised small- and medium-scale feed and fodder businesses enabling them to take up current and future feed supply opportunities.

Collaboration with Hungary expected to create major poultry boost in Ghana

GHANA HAS RECEIVED the first shipment of Hungarian parent stock chicken, the first step in what officials are hoping to be a long term fruitful relationship between the Hungarian and Ghanaian poultry farmers.

András Szabó, Ambassador of Hungary to Ghana welcomed the representatives of the partner companies at the Kotoka International Airport highlighting that this shipment of 22,000 day-old parentstock chicken is paving the way for other key projects in the sector.

Speaking to the press Szabó described the transaction as one of the great successes since the Hungarian Embassy has been reopened in Ghana in 2016. He pointed out that it was the result of the productivity of the engagement between private and government entities including the Ghanaian Poultry Association, the Hungarian National Agriculture Research and Innovation Centre, the Akate Farms, the Topman Farms and the Hungarian Bábolna Tetra Ltd which were involved in the coordination with the Embassy for the programme.

Dávid Békési, of Economic Counsellor, explained to the media that Hungary has considerable capacity and knowledge to share in the agricultural sector.

"One of the Embassy's main roles is to assist in order to introduce the partners and also find solution for specific financial framework. With this latest transaction the Hungarian partner expects to see about six million quality layer chicken in one year coming from Akate and Topman farms' hatcheries," he said.

Dangote signs US$450mn sugar production MoU with Niger State

THE PAN AFRICAN Conglomerate, Dangote Group has signed a Memorandum of Understanding (MoU) with the Niger State government for the establishment of a US$450mn state-of-art integrated sugar complex.

Under the MoU, the company will produce raw sugarcane on 16,000 hectares of land at Lavun Local Government through an out-grower scheme. Dangote Group is currently operating out-grower scheme in rice production in a number of states and has Africa's largest sugar refinery in Lagos and a sugar cane plantation in Numan, Adamawa State.

Speaking at the signing, the president of the group, Aliko Dangote said that Dangote's Integrated Sugar Project in Niger State will also include the establishment of integrated sugar mills, generate power, produce molasses, ethanol fuel, biomass and produce animal feeds. He commented that the project will generate over 15,000 jobs in the state upon completion and bring about a complete economic turn-around for the state.

Dangote said his investment was informed by his company's firm belief in the potentials of the Nigerian economy, adding that the new outlay will add value and create jobs for Nigerians.

Abdullahi Sule, group managing director of Dangote Sugar Plc, stated that the MoU would be a game changer for Niger State economy and Nigeria as a whole. He said the integrated sugar mills will have the capacity to produce 160,000 mt of raw sugar, pointing out that has been in the fore front of support for government industrialisation programmes through backward integration policy in agriculture.

Dangote Sugar Refinery Plc group managing director Abdullahi Sule, Dangote Sugar Refinery Plc chairman Aliko Dangote, Niger State governor Abubakar Sani Bello and Niger State deputy governor, Ahmed Muhammad Kesto at the MoU signing ceremony. (Photo: Dangote)

According to him, the Dangote Sugar Refinery is developing a sugar backward integration plan through the production of 1.5 mt/pa in ten years in Nasarawa, Adamawa, Kogi, Kwara, Taraba and Niger states, respectively.

The Group's executive director of stakeholder management and corporate communication Ahmed Mansur had also announced that the Group was investing over US$1bn in the agricultural sector in the country, specifically in rice, sugar, tomato and dairy productions.

Niger State commissioner for investment, commerce and industry Rahmatu Muhammad Yar'Adua said that the deal with Dangote Group will help grow the agricultural sector and create direct and indirect jobs in the state.

Ghana sets up new association to promote seed sector development

Through the US government's Feed the Future Initiative, the United States Agency for International Development (USAID) has launched the National Seed Trade Association of Ghana (NASTAG), in collaboration with the Ministry of Food and Agriculture and other development partners. NASTAG is a partnership between producers, traders, government institutions and processors in the seed industry. The Association aims to spur private sector investment and promote the use of high-quality certified seed.

Seven new Executive Council Members of the Association have been inducted into office to grow the competitiveness of Ghana's seed industry. The Executive Council will work to strengthen the business and technical skills of its members, promote collaboration between seed value chain actors, and advocate on regulations, standardisation and the provision of general seed information to all stakeholders.

The association will advocate on regulations, standardisation and the provision of general seed information to farmers. (Photo: Max Barattini/Adobe Stock)

The Government of Ghana has prioritised seed as a pillar in its flagship agriculture program, "Planting for Food and Jobs," and NASTAG will play a leading role in its implementation. In Ghana, promoting the growth of the seed industry and ensuring access to quality certified seed has the potential to boost agricultural productivity, as well as enhance food and nutrition security in the country.

"We believe improving the seed sector is critical to Ghana's economic growth. Developing Ghana's seed sector is a top priority for USAID and its partners, and today's launch is a milestone for the sector's growth," remarked Mrs Tajchman. "NASTAG is a critical and necessary organisation to develop Ghana's seed sector."

USAID and its Feed the Future partners support NASTAG with strategic planning, technical assistance, and increasing access to quality seeds for Ghanaian farmers. In Ghana, Feed the Future works to enhance agricultural productivity, links farmers to market and trade opportunities, and boost the nutrition of the most vulnerable populations.

AGRITECHNICA 2017, to be held in Hanover from 12-18 November, will converge the global agri-machinery industry and is expecting to create a major boost in sales.

AGRITECHNICA to boost agricultural machinery sales

THERE IS EVERY reason for the positive mood currently enjoyed by European agricultural machinery manufacturers.

"For several months, we have been experiencing an economic comeback in numerous markets," said VDMA managing director Dr Bernd Scherer at the preliminary press conference of the world's largest industry trade fair, AGRITECHNICA, to be held in Hanover from 12-18 November. Double digit growth rates in incoming orders, from Germany and abroad, are "an important indicator of a sustainable upswing".

For the year 2017 as a whole, VDMA anticipates a turnover volume of US$8.82bn from German production. This corresponds to a four per cent increase in comparison to last year. Dr Scherer stated that it is probable this positive trend will continue in 2018.

AGRITECHNICA 2017 will showcase the latest innovations from around the world. (Photo: AGRITECHNICA)

Strong half-year increase

In the first half of 2017, German agricultural machinery and tractor manufacturers achieved a seven per cent increase in turnover, to just over US$5.3bn. Factory capacity utilisation currently amounts to almost three months, a peak value last reached in the exceptional year 2013. Although in the first quarter growth was still restricted primarily to the German market, in the second quarter international turnover strongly followed suit, with an increase of 14 per cent. "That is precisely the signal we were waiting for," said Dr Scherer. After all, with an export ratio averaging 75 per cent, the German agricultural machinery industry also depends on "scoring in the international arena."

Strong demand for forage harvesting equipment

Developments in the forage crops harvesting equipment sector were especially dynamic, from mowers to forage harvesters. Manufacturers of feeding equipment as well as of loader and forage wagons, which likewise achieved double-digit growth this past season, are also very satisfied. Results for the leading farm tractor sector appear somewhat more differentiated: In particular, larger tractors with an engine performance exceeding 150 hp have experienced a boom. In contrast, the turnover of tractors below 50 hp experienced a significant decline compared to the same period of the previous year.

Economic turnaround apparent almost worldwide

Significant economic momentum is currently being derived from the German market, and especially from Eastern Europe. In contrast, France, the most important purchaser of German agricultural machinery and tractors, with an annual import volume of more than US$1.18bn, has yet to join the trend. Business is weak in the United States, where the willingness of farmers to invest remains low due to the continuing unsatisfactory income situation. By far the most positive mood can presently be seen in the agricultural countries Russia and Ukraine, which are benefiting from record harvests and excellent growth conditions. For the current year, VDMA likewise anticipates initial signs of growth in the Chinese agricultural machinery market, particularly since professional operations are increasingly demanding innovative agricultural machinery from Western producers.

The situation is similar in South America which nevertheless, due to restrictive import conditions, scarcely contributes to the turnover of the European agricultural machinery industry. "Despite all the developments in emerging countries and growth markets outside of Europe, the decisive importance of the European Union with regard to value must not be forgotten," said Dr Scherer. After all, the traditional European markets continue to account for more than two-thirds of the business transacted.

Digitisation increases profitability

Dr Scherer expressly emphasised that incentives for investing in agribusiness are closely connected with technological progress. "The willingness of farmers to invest is based primarily on the efficiency promised by our industry, and is hence driven by technology. Ultimately, digital networking offerings are to contribute to significantly increasing operational profitability. Moreover, this applies regardless of the form or size of the operation."

Organised by the Deutsche Landwirtschafts-Gesellschaft (DLG), more than 2,800 exhibitors from 53 countries are expected to take part in the event which will host international technical programme with conferences, forums, specials and expert talks on topical issues for agricultural development.

Poultry Africa 2017, held in Kigali, brought together more than 1,000 key players in poultry industry mainly from Europe, North-America, Asia and sub-Saharan Africa, to discuss the development of the poultry industry in Africa.

The widening horizons of Africa's poultry industry

"THIS IS A great opportunity for us to explore new technologies and learn best practices from each other in a bid to increase our poultry productivity. Importantly, this gathering is an occasion to forge partnerships as we want our poultry players to be connected into the global trade. Such get-together opens opportunities for our chicken industry players," said the Minister of agriculture and animal husbandry Dr Gerardine Mukeshimana, at the opening of Poultry Africa 2017, held in Kigali from 4-5 October 2017.

Mukeshimana stressed that the show was a rare opportunity to bring together poultry industry stakeholders across the value chain from farmers, distributors, processors, food ingredient suppliers, packaging and equipment manufacturers, scientists, to network and do business with players from around the world.

"Africa is ready to take its place on the world stage, if poultry farmers become vigilant and focus on increasing production and reducing imports."

-Nan-Dirk Mulder, senior analyst on animal protein at Rabobank

The expo aimed at creating closer business ties between sub-Saharan industry professionals and farmers and international producers and suppliers of the poultry and egg industry and brought together close to 1,500 delegates from Africa and beyond. It saw experts, investors, large and smallholder farmers share knowledge on poultry disease prevention mechanisms and latest technologies.

The event focussed on the poultry industry in Africa and saw international experts present and discuss topics of particular relevance to Africa's current poultry production situation. Topical veterinary issues were featured in the Leadership Conference programme arranged in association with the World Veterinary Poultry Association (WVPA). The topics ranged from zoonotic pathogens and antimicrobial resistance to avian influenza and poultry welfare concerns. Among the speakers were former WPSA President Edir N Silva and avian influenza expert David Suarez.

The event focussed on marketing and trade opportunities for Africa and discussed ways to improve profitability in poultry production. (Photo: moji1980/Adobe Stock)

Marketing and trade opportunities for Africa was another focus of the Leadership Conference programme and it featured experts who spoke on trade opportunities and feed supplies, the marketing outlook for broiler meat and eggs and ways to improve profitability in poultry production. Nan-Dirk Mulder from Rabobank and Bart Hillen from Danisco Animal Nutrition were two of the many experts disclosing their latest insights of the market.

Boosting poultry exports

One of the highlights of the event was a panel session titled "Marketing and trade opportunities for Africa," where poultry experts called on Africa's poultry and egg industry to increase exports and strive to become the world's leading producers of poultry products.

"Africa is ready to take its place on the world stage, if poultry farmers become vigilant and focus on increasing production and reducing imports," said Nan-Dirk Mulder, Xinhua reported.

He said that the poultry industry should evolve from a continental basis to a more global platform and that the sector can help Africa drive economic growth, create jobs, and improve the quality of life for rural people.

Addressing antimicrobial resistance and poultry diseases

The need to address antimicrobial resistance (AMR) in poultry in developing nations was one of the major issues raised during Poultry Africa. At the conference, scientists spoke of the need for small-scale farmers to be better trained and informed to manage their farms effectively.

Mohammad Rafiqul Islam, principle scientific officer for livestock at Bangladesh Agricultural Research Council, pointed out that farmers in developing countries often use antibiotics whenever there was a disease outbreak without accurate testing. He also pointed out that poultry farming in Africa is one the biggest business opportunities for young people on the continent and that every effort must be taken to adopt preventive measures to counter future threats to the sector.

Experts also discussed the high pathogenic avian influenza that has caused devastating effects in Africa and effective ways to fight poultry diseases.

Edir Silva, former president of the World Poultry Science Association (WPSA), said, "We need to come up with strong preventive measures to contain poultry diseases and to boost financial support for preparedness and response efforts in Africa and globally."

R Ravindranath, managing director at Milltec Machinery, speaks to *African Farming* abut the company's innovations in rice milling.

Pioneering innovation in rice milling

Can you tell us a little about Milltec Machinery's technological solutions in milling?

MILLTEC MACHINERY IS a leading technology provider offering comprehensive solutions for rice milling, pulses processing, maize (corn) milling and roller flour milling plants. Milltec also provides grain storage and handling technology to the customers apart from colour sorting and packaging solutions.

Milltec has pioneered in making end to end solutions in rice milling and has established many plants across the world. Milltec offers specialised process in milling of rice, which ensures higher head rice yield through its ELITE series product line.

The ELITE series machines are designed focussing specially on the processing of long grains with the goal of achieving higher return on investment, yield, reducing broken percentage and getting best performance with less power consumption.

Milltec has revolutionised rice milling industry by committing to reduce breakage through its efforts to modernise mills with minimum investment.

What can you say about the innovations that you have brought to the industry with your history of more than 20 years?

Milltec has revolutionised rice milling industry by committing to reduce breakage through its efforts to modernise mills with minimum investment. We offer high precision machinery at moderate cost.

Milltec was first to introduce yield management system for rice milling in India. It was the first company to offer high capacity milling lines of 10 TPH ways back in 2006. We also introduced operator friendly "fit & forget" machines to the segment.

R Ravindranath, managing director at Milltec Machinery. (Photo: Milltec Machinery)

Milltec is also the only company to offer 24 hour response time for any service requirements. we have established sales and service offices strategically in India, Nepal, Bangladesh, Thailand, Sri Lanka, Vietnam, Cambodia, Pakistan, Myanmar and Nigeria.

Could you give us some information about your role and place in the global industry, and your share in the market?

Milltec has a strong presence in the global rice milling industry apart from holding a 35 per cent market share in the segment in India.We also serve the countries in East Asia, West Asia, Europe and African countries. We have capacities ranging from 6 -20 TPH lines of more than 100 turnkey plants installed by our engineering division.

Scientists are working towards unravelling the genetics behind producing plumper chicken.

The genetics behind chicken weight adaptation

PRIZED FOR THEIR plumpness, poultry farmers have made incredible gains through agricultural breeding programmes to maximise chicken size and weight to benefit worldwide consumption, where demand continues to grow the most for any meat.

To aid farmers in their quest to produce more plump roosters and hens, scientists have been interested in probing the specific genetics behind the weight adaptation of chickens, better known scientifically as Gallus gallus.

Uppsala University scientist Örjan Carlborg has now led an international research to achieve a better understanding of the genetic architecture behind chicken weight.

To explore weight adaptation, Carlborg's research team used two divergently bred lines of White Plymouth Rock chickens, which have been selected since 1957 for high and low body weight, respectively. In their study, they used an advanced intercross line founded by mating the high and low weight lines after 40 generations of selection. The average 56-day body weight in the high-weight line was then 1,412 g compared to that of the low weight counterparts that only weighed 170 g (only about 12 per cent of the weight compared to the high weight line).

Different variants at many genetic loci contribute to the large divergence between the lines selected for high and low weight.

Using the 15th generation of the intercross line between the high and low weight lines, they identified 20 different genetic loci that when examined explained more than 60 pe rcent of the additive genetic variance for the selected trait.

"Our work with this long-term selection experiment has revealed that different variants at many genetic loci that contribute to the large divergence between the lines selected for high and low weight," said

Genetics play a role in deciding a chicken's capacity to gain weight. (Photo: Dusan Kostic/Adobe Stock)

corresponding author Orjan Carlborg. "This is an interesting experimental illustration of how even small and phenotypically homogenous populations, such as the founders of our divergent lines, can harbour many genetic variants that do not diversify the population normally. But still they can allow rapid and extreme adaptations when the population is subjected to intense selection."

They further focused on seven of these genetic hotspots, known as quantitative trait loci, and found that only two could be more finely mapped to a single, well-defined loci; the other five contained linked loci with multiple gene variants or were epistatic. This detailed dissection of the loci contributing to the polygenic adaptations in the Virginia chicken lines does in this way provide a deeper understanding of the genome-wide mechanisms involved in the long-term selection responses.

Although the long-term selection responses for weight were due to many loci of small individual effect, conforming to the assumption of the infinitesimal model of quantitative genetics, the genetic mechanisms within the individual loci were more complex than assumed in this model. The scientists now hope to further explore this chicken model system to further increase our understanding of the genetic mechanisms of body-weight adaptation, and also evaluate how the within-locus complexities will affect predictions of selection responses obtained using the current quantitative models.

"For many, the ultimate aim for studies designed to dissect the genetic architecture of a complex trait is to find the causal genes and mutations underlying the trait," said Carlborg. "It is, but we also need better insights about how to account for contributions by more complex genetic mechanisms to selection-responses, whether in nature and agriculture, for improving predictions of adaptations emerging during long-term selection. Our work with the Virginia chicken lines provides valuable empirical insights to how complex genetic mechanisms have contributed to polygenic adaptation in the past, and it will help us in work to develop better predictive models for the future." Ⓔ

-Phys.org

Bird flu outbreak leads to huge loses in Western Cape

MORE THAN TWO million birds are estimated to have died or have been culled since an outbreak of highly pathogenic avian influenza or bird flu in the Western Cape, South Africa in August. With over 29 million chickens commercially farmed and 185,000 backyard birds in the province, this accounts to nearly seven per cent of the total birds. Early estimates suggest production losses of about US58mn, Economic Opportunities MEC Alan Winde told the press. "The Western Cape is the worst affected province in South Africa. In some regions, poultry production farms are clustered in a specific area. In other provinces, cases have occurred at locations far removed from these hubs," he said.

The province has established a joint operations centre to facilitate its response to the disaster. Winde said that the centre has requested the National Disaster Management Centre's guidance to potentially declare the outbreak a provincial disaster. This is the first time that a highly pathogenic strain of bird flu has been detected in poultry in South Africa.

The outbreak has led to the death of more than two million birds in Western Cape. (Photo: Rafael Ben-Ari)

Cargill expands its presence in African animal nutrition business

EXPANDING ITS COMMITMENT to growth in sub-Saharan Africa, Cargill has taken full ownership of the Southern Africa based Provimi-branded Cargill Premix & Nutrition SSA business from Astral Foods.

Cargill previously owned 75 per cent of Provimi-branded Cargill Premix & Nutrition as part of a joint venture with Astral Foods. It has now acquired the remaining 25 per cent of that company.

As part of that investment and to reinforce its commitment to sub-Saharan Africa, Cargill has built a new premix and base mix facility in Pietermaritzburg. It also assumed managerial control of NuTec Southern Africa and migrated its name and product portfolio into Cargill's Provimi brand.

"This acquisition is an important decision for us and plays a significant role in helping Cargill realise our larger growth plan for sub-Saharan Africa," said Guillaume Smeets, managing director for Cargill's animal nutrition business in Middle East and Africa. "We are committed to nourishing the world in a safe, responsible and sustainable way. Moving our investment from a joint venture to full ownership further reinforces our commitment to support our customers, grow our workforce and reinforce the growing agricultural sector in the region."

The company said that Astral Foods will remain an important business partnership for Cargill. As part of the deal, Astral and Cargill entered into a five year premix supply agreement, and Cargill will continue to support Astral technically, building on the basis of a long and solid relationship. Gary Arnold, Astral's business development director, added, "This deal allows Astral to focus on its core business as an integrated poultry company, while at the same time accessing the great asset Cargill built in South Africa through the supply of vitamin and mineral products and various feed additives, along with technical support to ensure the optimal performance of our poultry genetics."

This investment is part of Cargill's larger growth plan for sub-Saharan Africa. (Photo: Krugloff/Adobe Stock)

Smeets said that the investment was part of a broader plan to develop Cargill's presence in the animal nutrition business throughout the Middle East and Africa region. "Customers can leverage Cargill's worldwide research and development capabilities, together with our high-quality nutritional products and world-class technical support, to further optimise their results and effectively produce safe food," he explained. "That's why we invested in our factory in South Africa to make it state of the art, taking feed and hence food safety to the next level."

It is estimated that Africa's population will double by 2050, representing more than 50 per cent of global population growth. "Protein demand in Africa has grown enormously over the past five years and is projected to continue along this growth trajectory. The rapidly growing markets and increasing animal productivity in this strategic area are an excellent fit in helping Cargill to achieve our goal of nourishing the world," Smeets concluded.

Researchers at the International Livestock Research Institute (ILRI) have discovered a thermostable vaccine against the highly contagious problem of peste des petits ruminants (PPR) that can prove instrumental in the eradication of the disease.

PPR eradication in sight?

PPR, COMMONLY KNOWN as goat and sheep plague, is a highly contagious viral disease that primarily affects small ruminants including goats and sheep. With symptoms very similar to rinderpest, the disease is caused by a virus of the genus morbillivirus and is associated with high mortality and severe socio-economic impact. The clinical symptoms of the disease are pyrexia, oculo-nasal discharge, stomatitis, pneumonia and diarrhoea. The disease kills up to 70 per cent of the herds of sheep or goats it infects, animals vital to the survival of many of Africa's poorest people.

While initially the disease was bound to Central and Southern Africa, the Middle East and the Indian subcontinent, recent reports by the ILRI show that it has now spread to parts of North Africa, sub-Saharan Africa as far south as Zambia, the Middle East, Central and South Asia. PPR causes huge losses to livestock farmers, especially small holder farmers. Recognising the role of PPR in the livelihoods, there has been coordinated research programme working globally towards the eradication of the disease.

The new vaccine can be used in the field for up to 30 days without refrigeration

Following the rinderpest example

Rinderpest is a deadly cattle disease that plagued Africa and other parts of the world ever since cattle were domesticated. In the 1980s, an outbreak, originating in Sudan, killed millions of bovines across the continent. In 2011, the United Nations declared rinderpest as eradicated, an achievement that was hailed as a triumph of veterinary medicine, as rinderpest became only the second disease, either animal or human, to be wiped out, the first being smallpox.

Since the eradication of rinderpest researchers have called attention to PPR, the related but significantly different morbillivirus disease. Apart from causing major

PPR kills up to 70 per cent of the herds of sheep or goats it infects. (Photo: Klevit/Adobe Stock)

economic impact on farmers and affecting food security in affected countries, it is also a threat to biodiversity of wildlife species, many of which are endangered or threatened, including gazelles and mountain caprines.

Scientists are encouraged by what has been achieved with rinderpest and plan to apply the understanding of the factors that marked rinderpest eradication to PPR. There has been a call for a global programme aimed at the total eradication of PPR. The FAO has hosted a number of symposia at which chief veterinary officers have unanimously requested an international initiative against PPR.

Consequently, the World Organisation for Animal Health (OIE) and the FAO have developed a Global Strategy for the Control and Eradication of PPR, within the framework of the Global Framework for the Control of Transboundary Animal Diseases (FAO/OIE GF-TADs) Working Group. In April 2015, over 300 high level representatives from all corners of the globe met in Abidjan, Côte d'Ivoire, at an international conference organised by the OIE and FAO with the aim of adopting this global strategy, the ministerial recommendations issued by the meeting defining PPR as a top priority disease that should be eradicated in the next 15 years. Based on the rinderpest model, a gradual, step-wise method has been developed for the global control and eradication of PPR.

Vaccination is the answer

With no cure for the PPR discovered yet, vaccination has been instrumental in the battle against the disease. However, the existing PPR vaccines, while providing life-long immunity against the disease, require continuous refrigeration. This requires vaccinators to set up cold chains, transporting it to its destination in cans of liquid nitrogen between refrigeration units. This severely limits the utility of the vaccines in remote locations with poor infrastructure.

Research has shown that storage and shipment can have a strongly detrimental effect on the potency of vaccines. When catering to tropical regions with poor infrastructure, what is required are vaccines that can withstand storage or shipment at changing and/or high temperatures.

A new paper titled 'A thermostable presentation of the live, attenuated peste des petits ruminants vaccine in use in Africa and Asia,' by researchers at the International Livestock Research Institute (ILRI) describes development of a thermostable version of the current, effective vaccine against PPR. The team of scientists working on the project in the research institute in Kenya are hopeful that PPR can be eradicated too, thanks to this new vaccine.

The vaccine was created using a process called lyophilisation, or freeze-drying, on the related rinderpest morbillivirus. According to the ILRI, the new vaccine could be used in the field for up to 30 days without refrigeration.

The study found that vaccines produced using LS and the rinderpest method of lyophilisation were the most stable, possessing sufficient thermostability for use without a cold chain for up to 30 days which will greatly facilitate the delivery of vaccination in the global eradication of PPR.

"In addition to reducing the need for cold chain infrastructure, this level of stability frees vaccination programmes from the requirement for vehicles, which together with per diem is the principal cost of vaccine delivery and vaccination as a whole. It also facilitates the integration of community-based vaccination programs that are critical to obtaining good herd immunity levels and extending the reach of livestock health and disease eradication programs to remote and politically unstable areas," the report stated.

While the new vaccine is quoted as a major breakthrough, it is still only the first step. The next step should be to adapt production to commercial scale lots and pilot the use of the vaccine in practical field programmes. The objective of global control and eradication of the disease within 15 years can only be achieved with sufficient funding and global commitment to the cause bolstered by strong political commitment. E

Vaccination is key in the battle against PPR. (Photo: livestockcrsp /Flickr)

As the fall army worm (FAW) continues its devastating rampage across Africa, agencies like CABI are working flat out to combat the pest, though farmers are continuing to suffer as available pesticides and early attempts at control show marginal effect. An 'accidental' push-pull breakthrough, however, can be a turning point. Tim Guest reports.

Hope in the fight against FAW

Fall army worm damage to a maize crop. (Photo: icipe)

IN OUR MAY/JUNE issue, we took a look at the FAO's stakeholder meeting earlier this year discussing a multi-pronged approach to the huge problem of the spread and effects of the FAW in Africa. The FAO's findings and recommendations, outlined in that issue, go some way towards solving the problem using certain methods of control to try against the pest that, if anything, will merely be eliminated as having little or no impact, while others may be found to be more effective.

The use of emergency pesticides for smallholder farmers was one of the approaches put forward, admittedly with caution that such methods might have limited effect for a number of reasons. Indeed, cases in Malawi highlight the problem. One method of control, push-pull, was however not mentioned specifically and *African Farming* can reveal a breakthrough could have been made.

First, let us look at what is going on on the ground in a typical FAW occurrence.

Recognising FAW – a case in point

At the plant clinic in Dowa Turn Off in Kasungu Agriculture Development Division (ADD) in Malawi, a farmer arrives with samples of his damaged maize crop to see if the plant doctor can identify and help. This is not an unusual scene played out in other regions. On his less-than-half-a-hectare plot of irrigated crop, just like other smallholders in his community, a new pest has appeared and seriously impacted his maize.

The push-pull method pioneered at the International Centre of Insect Physiology and Ecology could present a major breakthrough in the fight against FAW

The damage started a few weeks after germination when the tips of the maize funnel appeared chewed and stunted with small caterpillars found inside the funnel. In time, the leaves, cobs and kernels were chewed and the farmer's pesticide control methods proved useless. From a typical yield of around 80 x 50-kg bags from his field, he expects a 50 per cent loss and the prospect of not being able to feed his family. His first thoughts are to request more effective pesticides from the government as those recommended by extension staff and already bought and applied are not working and he cannot afford any more chemicals.

This picture is typical and on the increase as the FAW spreads across Africa.

In Malawi, the government, which has advised farmers to plant early and monitor their crops regularly during the start of the growing season, has recommended proper spraying using the 'appropriate pesticides.' However, with farmers experiencing varied success with pesticides throughout this whole initial period fighting the FAW, this advice must be weighed carefully alongside other factors such as an individual's ability to afford such pesticides. So far, the use of chemicals including cypermethrin, chlorpyrifos, indoxacarb and deltamethrin to fight FAW has been advised in Malawi, together with biopesticides such as Bacillus thuringiensis variety Aizawai. Targeted spraying advice has also been given to ensure affected crop plants are sprayed mainly on the funnel where the young larvae typically congregate, and timed so that they have not yet had a chance to burrow into the funnel itself. This is crucial, as once the larvae burrow into the funnel and cob they grow bigger and are much harder to kill.

The application of sandy soil directly into the maize funnels once damage has been spotted on the crop helps to control the FAW

Push-pull field not attacked by FAW. Professor Zeyaur Khan with farmer David Okiya in Trans Nzoia district in Kenya. (Photo: icipe)

Apart of the problems of resistance and some pesticides clearly not working, another issue of real concern when spraying is the use of the right techniques, equipment and proper protective clothing: many of these pesticides are toxic and can damage not only the environment but also human health. Often farmers desperate to treat their crops, though with little income, sometimes do so without protective

Smallhold famers in Kenya inspecting maize crop damage from FAW. (Photo: icipe)

equipment and without following clear health and safety guidelines and instructions.

It should be mentioned that the application of sandy soil directly into the maize funnels once damage has been spotted anywhere in the crop when it is around two feet tall will also help control the FAW: it has been found that the abrasiveness of the sand to the skin of the caterpillar will kill the pest. But the real potential non-pesticide breakthrough against the FAW – that's not sand – is push-pull.

A push-pull breakthrough against FAW beckons

In the words of Rothampsted Research Professor John Pickett, the FAW is 'a spectacular problem,' but one that sees a collaborative team of colleagues under Professor Zeyaur Khan at the International Centre of Insect Physiology and Ecology (icipe) making progress and 'showing that push-pull gives powerful control' against FAW.

African Farming has looked at push-pull methods in the past, as pioneered by John Pickett's team from Rothampstead. The science behind the technology focuses specifically on the problems facing smallholder and subsistence farmers using an holistic approach. This has so far had major rural socio-economic impact by enabling around 97,000 such farmers release themselves and their families from the grips of poverty. (icipe introduced push-pull into Ethiopia five years ago and it has progressed tremendously with more than 8,000 farmers now using the technology).

Since 2011, Rothampsted and the icipe have been working together along with other national parties in a number of countries to develop a "climate smart" variant of push–pull, which includes two new drought-tolerant companion plants; this research is currently being extended to drier agro-ecosystems and applied to a wider range of cereal crops, including sorghum.

Scientists working on the push-pull pest control method have found that a repellent plant, desmodium intortum, could repel FAW moths from laying their eggs on cereal plants and hence provides control against the pest.

However, it is the way that push-pull crop management exploits the natural relationships between plants and insects that is of relevance to FAW. Push-pull scientists have extensively investigated the ecology of a particularly widespread cereal pest, the stem borer, and its relationship with maize. What they discovered was that introducing a carefully selected mix of forage plants into maize fields has a dramatic effect on cereal yields and total smallholding farm output.

A Maize Footnote

In mid-September, CABI confirmed that since it arrived in Africa in 2016, the FAW has been reported in 28 African countries, presenting a now permanent agricultural challenge for the continent. FAW mainly affects maize and can cut yields by up to 60 per cent. CABI estimate that, if not properly managed, the pest will cost 10 of Africa's major maize producing economies a total of US$2.2bn to US$5.5bn a year in lost maize harvests.

By relying on purely the natural plant chemicals to drive insect pests away from the main crop plant and attract them to another host food plant, one that can withstand attack better than maize and on which the pest (at whatever relevant stage in its lifecycle) will feed, ultimately leaves the crop plant untouched.

Scientists conducting the research discovered exciting new properties of one particular companion plant, desmodium, a forage legume. Besides being nutritious for dairy cows, it was found to repel insect pests of maize and substantially reduce damage from striga, a destructive parasitic weed. A double win.

The big news

Now, at time of going to press, this is the really exciting news in the fight against the FAW; *African Farming* has been told by icipe's Professor Zeyaur Khan that the push-pull system, using its attractant and repellent companion plants to attract and repel cereal stem borers, has led to unexpected recent results. "Recently, we accidentally found that the systems (effective against stem borers) also provide significant control to the new invasive pest, fall army worm. While we are working on the chemical ecology of the push and pull plants against FAW, we suspect that the repellent plant, desmodium intortum repels FAW moths from laying their eggs on cereal plants and hence provides control."

At this time, Professor Khan was unable to share any field data with us. This is currently under publication, but this news comes at a time when many across Africa are desperate to find a solution to combat the FAW and, that it may be this pest can be managed without the widespread use of dangerous, toxic chemicals is an even greater plus to some very promising news.

Two diseases with the name 'mildew' could not be more different, explains Dr Terry Mabbett.

How to tackle downy mildew in cucurbit crops

Field-grown pumpkin seen here is susceptible to downy mildew disease. The dull, overcast conditions are ideal for disease development and spread. (Photo: Dr Terry Mabbett)

CUCURBIT CROPS INCLUDING cucumber, courgette (zucchini), pumpkin, squashes and melons suffer from a range of foliar diseases. Two diseases carry the word 'mildew' in the common name although they could not be more different in both causal pathogen and conditions required for disease development. The two diseases are powdery mildew and downy mildew.

Powdery mildew is caused by a true Ascomycete fungus (Erisyphe cichoracearum) while the pathogen (Pseudoperonospora cubensis) responsible for downy mildew is closely related to the Phytophthoras. Phytophthora and Peronospora plant pathogens were originally regarded as true fungi and were in the class Oomycetes. However, they are currently called the Oomycota and now within a much broader and wider group (Phylum Chromista) together with the algae. They are described as 'fungus-like'.

The conditions required by these pathogens to cause disease could not be more different. Colonisation of cucurbit crops by Erisyphe cichoracearum resulting in powdery mildew disease is generally favoured by foliar dryness with no rain or free moisture (condensation or dew) on the leaf surface. The optimum temperature range is 21-26°C, although fungal activity is still recorded at temperatures up to 35°C.

Daytime temperatures in many warmer climate countries are unfavourable for the development of downy mildew disease but night-time conditions with characteristically lower temperature and higher humidity are often ideal

Conditions for the 'unrestrained' activity of Pseudoperonospora cubensis are towards the other end of the temperature and humidity spectra. This pathogen likes it cool and moist with optimum conditions for sporulation around 15°C between six and 12 hours of free water present on the leaf surface, especially as dew.

Daytime temperatures in many warmer countries are unfavourable for the development of downy mildew disease but night-time conditions with characteristically lower temperature and higher humidity are often ideal. Downy mildew is common on a wide spectrum of outdoor-grown cucurbit crops but will just as easily develop in the greenhouse, if presented with the right conditions of temperature and moisture.

The fungus-like pathogen

Pseudoperonospora cubensis is an obligate parasite or biotroph, which means it requires the living plant host tissue to survive and reproduce. As such the

pathogen requires cucurbit crops to be available throughout the year, or alternatively wild species belonging to the family Cucurbitaceae such as wild bitter gourd (Momordica charantia). This means that Pseudoperonospora cubensis will not survive long periods at sub-zero temperatures or severe drought simply because there will not be any host material left available, either cultivated or wild.

Fungicide application is essential especially in high risk areas, on susceptible crops and under conditions that favour pathogen activity and disease development

Asexual spores called sporangia produced by the pathogen are dispersed and disseminated in air currents to nearby plants and neighbouring fields often over long distances. Having alighted on a susceptible cucurbit host, the sporangia produce biflagellate zoospores that swim to and encyst on the stomata to form germ tubes. The appressorium (penetration peg) thus produced by the zoospore forms a penetration hypha which enters into the leaf tissue via the stomatal aperture. Hyphae grow through the leaf mesophyll tissue to produce haustoria, specialised structures for transferring nutrients and signals between the host and the pathogen.

Disease symptoms will appear on the leaves between four and 12 days after infection under optimum conditions for sporulation which are about 15°C with free moisture present on the leaf surface for periods of six to 12 hours. Sexually produced spores called oospores (thick-walled, resting spores) are produced but they are rare, with a little known and poorly understood role.

Disease cycle and symptoms

Pseudoperonospora cubensis causes chlorotic (yellow) lesions on the foliage which are naturally angular in shape, simply because they are bound and restricted by the prominent veins on the abaxial (lower) leaf surface of cucurbits crops like cucumber.

Close inspection of the underside of the leaf during humid conditions reveals a grey-brown to purplish-black coloured 'down' which is actually sporulation (spore production) by the pathogen. When viewed under magnification these sporulation sites on the abaxial surface of the leaf show acutely and dichotomously branched sporangiophores (stalks) bearing lemon-shaped sporangia.

Leaves will eventually turn necrotic and curl upwards and at this stage the disease is colloquially called 'wildfire.' First because of how rapidly the disease develops and spreads but also because the leaves look as though they have been scorched by fire.

Symptoms shown by the leaves on watermelon and cantaloupe melon are different to those that appear on cucumber and pumpkin. Leaf spots on these melon crops are not typically angular and will turn brown to black in colour with an exaggerated upward leaf curling frequently occurring.

Irrespective of the type of cucurbit crop targeted by the pathogen only the leaves are actually infected, although side-effects may impact on fruit yield and quality. The two major effects of downy mildew are:

- Reduced crop yields and higher incidence of misshapen fruit (especially in cucumber).
- Significant numbers of sun-scalded fruit due to the loss of leaf cover because of the increased exposure of fruit to direct sunlight. Sun-scald is especially prevalent in watermelon and certain types of squash.

Host specificity and pathotypes

Pseudoperonospora cubensis isolates have a specific host range in the cucurbit plant family, which means a particular pathogen isolate (population) will infect some cucurbits but not others. For instance, cucumber and squash may be grown side by side but only the cucumber succumbs to downy mildew disease. Pathogens that exhibit this type of host specificity are said to exist as a number of distinct pathotypes, each with its own particular host range. At least five different pathotypes of P. cubensis have been described in North America.

Management and control

Successful control of downy mildew requires an integrated approach with fungicide application. Cultivars showing host

Lower surface of a cucumber leaf showing very prominent leaf veins. Raised veins essentially restrict and compartmentalise the disease to the inter-vein areas which is why downy mildew lesions are angular in shape. (Photo: Dr Terry Mabbett)

resistance to P. cubensis will provide the basis for disease management and should be used wherever possible. Cultivars resistant to downy mildew have been designed and developed for cucumber and cantaloupe melon and to a lesser extent for squash and pumpkin. And although the pathogen has been able to overcome resistant cultivars of cucumber these are still more effective than inherently susceptible cultivars in delaying the onset of infection.

Downy mildew is an aggressive and destructive disease of cucurbits and even when resistant varieties are grown so satisfactory control is unlikely to be achieved without fungicides. Fungicide application is essential especially in high risk areas, on susceptible crops and under conditions that favour pathogen activity and disease development. Both contact protectant and systemic suppressive fungicides are applied.

Protectant fungicides and especially fixed copper fungicides like cuprous oxide have always played an important role and part as stand-alone spray applications in the management of downy mildew on cucurbit crops. Copper fungicides must be applied prior to infection (ie, before the spores land on the leaf surface) with repeat applications required.

Exceptionally short spray intervals (less than five days) are invariably required for the protection of exceptionally fast growing cucurbit crops such as cucumber. In the tropics it is not unusual for field grown cucumber to produce one new leaf per vine per day which will subsequently expand by up to a factor of 30 within seven days. Such an exceptional rate and magnitude of leaf expansion effectively dilutes fungicide deposits to fungicidally inactive levels in just a few days, thus presenting a foliar surface which is essentially unprotected against infection by the pathogen.

Newly-emerged leaves on cucurbit plants expand quickly to dilute any protectant fungicide on the surface. White spotting seen on the older leaves is actually powdery mildew disease. (Photo: Dr Terry Mabbett)

With effective spray coverage copper ions (Cu^{2+}) dissolve from the fungicide deposit at a sufficient concentration to kill zoospores as they germinate, and before they have time to penetrate and gain entry into the leaf tissue to establish an infection.

Broad spectrum protectant copper fungicides such as cuprous oxide will also play a crucial integrated role in any fungicide spray programme that includes systemic fungicides. Many of these systemic, pathogen suppressive and site-specific action fungicides have established records of selecting out resistant strains to their action within the pathogen population. Spray application of copper fungicides such as cuprous oxide can be rotated with applications of these systemic, suppressive, site-specific action fungicides to cover and protect the latter against pathogen resistance development.

Early detection of the disease is important for effective pre-emptive action by fungicide application. Many cucurbit growers will invariably lose their battle against downy mildew before it even starts by waiting until they can clearly see the disease before initiating a programme of fungicide spraying.

Early detection of downy mildew and prompt preventative action by the application of protectant fungicide is imperative for the control of this disease. Disease forecasting systems have been developed to assist growers in obtaining the most appropriate timing for fungicide application. Forecasting systems track outbreaks of the disease using prevailing weather parameters and spore trapping devices to provide a forecast, or a risk assessment for future outbreaks.

Advanced stages of downy mildew disease on cucumber are characterised by a rapid brown necrosis from the leaf margin inwards and called 'wildfire'. (Photo: Dr Terry Mabbett)

Identifying the genetic markers associated with two devastating diseases can contribute towards improving food security and securing income for farmers.

Unlocking the cassava disease genetic code

AS DEADLY VIRAL diseases have been spreading and affecting the production of cassava varieties of East African origin, scientists have identified the link of genetic markers as a potential resistant to each of the diseases.

Research has revealed that two genetcially related cassava varieties, Namikonga and Albert, grown by farmers in areas that have been the hotspots for the viral diseases for many decades, have shown high resistance despite being subjected to the diseases for a long period because of a genetic marker link with their DNA.

A cassava root affected by a virus that creates a dry brown colour. (Photo: International Institute of Tropical Agriculture/Flickr)

Cassava virus

Cassava brown streak disease (CBSD) and cassava mosaic disease (CMD) pose major threat to cassava production in Africa. As described by the International Institute of Tropical Agriculture (IITA), severe CBSD infections can cause yield losses of between 70 and 100 per cent, with CMD leading to a crop loss of upto 95 per cent.

In a recent study published in the *Theoretical and Applied Genetics*, scientists from Tanzania, Kenya, South Africa and the USA said that CMD and CBSD are among the greatest constraints to cassava production in the eastern, central and southern Africa. Cassava is the main crop for food and income for millions of smallholder farmers in these regions.

With nearly all cassava varieties being susceptible to either one or both diseases, the farmers face massive production loss each year that put food and income at risk in the entire region. The diseases have reduced cassava yield by more than a half from 10.5 tonnes per ha to 5.5 tonnes per ha in the last 20 years in Tanzania, the second largest producer of cassava in East Africa.

Genetic marker: a solution

Thus, with the aim of finding a sustainable solution for cassava farmers across the region, the identification of genetic markers has established a base for marker-assisted breeding in order to ensure productivity and to protect crops from viral attacks.

"The studies have enabled us to better understand the location of genes we suspect are associated with resistance to CBSD in the DNA of the farmer-preferred cassava variety, Namikonga, and CMD in the variety Albert. Once validated, this will help speed up breeding through marker-assisted selection (MAS) which shortens the breeding cycle and reduces the offspring population that breeders have to work with," said Esther Masumba, co-author of the study and a molecular breeder from the Ministry of Agriculture, Livestock and Fisheries, Tanzania.

"Breeders will be able to quickly narrow down from the thousands of offspring to only those with the desired markers," she added.

In addition, unlike the conventional breeding methods which are often laborious and expensive, the application of molecular markers in breeding and selection of crop varieties can also potentially reduce both breeding time and costs, the study has emphasised.

"The use of markers in breeding increases the efficiency and accuracy of breeding. It allows accurate selection of offspring from a cross with the desired combination of genes for dual CBSD or CMD resistance," said Morag Ferguson, co-author of the study and a molecular breeder at the IITA, Kenya.

"For west Africa, where there is great fear of CBSD spreading and with devastating effects on the food security, the markers can assist in pre-emptive breeding," Ferguson further explained.

The scientists crossed the two local cassava varieties through hand pollination, resulting in offspring that are resistant to the two deadly diseases. They found that whereas Namikonga is vulnerable to CMB, Albert is susceptible to CBSD.

Although MAS has not been widely adopted in cassava production, it has been used to a limited extent in the region. The study has emphasised that the identification of genetic markers associated with CBSD resistance would further enable pre-emptive breeding through MAS for CBSD resistance in countries not yet affected, but threatened, by the disease.

"We are very happy with the findings of our studies which are a result of over six years of research. It is an important milestone in the efforts to revive cassava production in east, central, and southern Africa where the two diseases are still a major problem that continues to threaten the region's food security," said Ferguson.

The release of two high-yielding flood-tolerant rice varieties developed by the Africa Rice Centre (AfricaRice) – FARO 66 and FARO 67 – is expected to provide much needed respite to the rice cultivation in the region, which is subject to recurrent and devastating flooding.

Flood-tolerant strains to bolster Nigerian rice cultivation

RICE IS ONE of the major crops cultivated in Nigeria and contributes significantly to the nation's economy and food security. The last couple of years have seen a marked improvement in Nigeria's rice cultivation. According to the Rice Farmers Association of Nigeria president Aminu Goronyo, annual rice production in Nigeria has increased from 5.5 million tonnes in 2015 to 5.8 million tonnes in 2017. Programmes like the CBN's Anchor Borrowers Programme which have helped a total of 12 million rice producers and four million hectares of FADAMA rice land have contirbuted to improving rice production in the country.

However, flooding is a major threat that continues to affect rice farmers in the region. Rainfed lowlands occupy more than 70 per cent of total rice area in Nigeria and are prone to recurrent flooding caused by heavy rainfall or overflow of nearby rivers.

Yield losses resulting from flooding may range from 10 per cent to total crop loss. In 2012, when Nigeria experienced the worst flooding in 40 years, floods reduced rice production by about 22 per cent.

In September this year, 458 farms under the Central Bank of Nigeria (CBN) anchor borrowers' scheme were submerged by flood in parts of Kwara State. The farms are situated on the 3,200 hectares federal government's Tada-Shonga irrigation land for rice cultivation in Shonga. The produce was due for harvest in October this year and caused huge loss to the farmers.

With the looming threat of global warming, scientist warn that flooding will grow to be increasingly problematic. Studies by AfricaRice on future rice climates project massive increases in overall precipitation in north and northwest Nigeria.

Most rice varieties can get severely damaged or killed within a week of severe flooding. "Depending on the intensity of flooding, it can reduce yield, it can prolong the growth duration and in extreme cases, it can cause total crop loss," said Dr Ramaiah Venuprasad, AfricaRice lowland rice breeder. He explained that the only possible solution to tackle this problem is the use of flood-tolerant varieties.

Flooding is one of the biggest threats to Nigerian rice cultivation. (Photo: Naviya/Adobestock)

Under submergence, FARO 66 can yield about 80 times higher than its parent FARO 52, which cannot survive this condition.

Flood-resistant rice strains

AfricaRice has been dedicated to the development of flood resistant rice strains for many years now. The release of two flood-resistant rice strains in Nigeria, FARO 66 and FARO 67, marks a major breakthrough for rice cultivation in the country. These flood-tolerant varieties were selected based on farmers' rankings and results of on-station, multilocation and on-farm trials conducted in partnership with the National Cereals Research Institute (NCRI) and the National Rice and Maize Centre (NRMC).

The benefits of precision breeding

Dr Venuprasad's team, who ran the project, used marker-assisted breeding to introduce into popular Nigerian rice varieties a gene called 'SUB1,' which confers to rice plants the ability to tolerate complete short-term submergence. This technique has been very successfully used in Asia to upgrade popular Asian rice varieties with submergence tolerance. For instance, Swarna-Sub1 is the first submergence-tolerant high-yielding rice variety developed in Asia that was released in 2009. It is grown by more than 1.3 million farmers in India.

However, the initial efforts to introduce the SUB1 varieties directly from Asia were unsuccessful as these varieties were not locally adaptable. AfricaRice, therefore, decided to upgrade locally adapted popular rice varieties for submergence tolerance.

Highlighting the advantages of the flood-tolerant varieties developed for Nigeria, Dr Venuprasad said, "Compared to their parents, in addition to submergence tolerance, they have higher yield potential and suitable growth duration and height." Like their parents, they have good grain quality with medium-long slender grains

and are moderately tolerant to iron toxicity.

Under submergence, FARO 66 can yield about 80 times higher than its parent FARO 52, which cannot survive this condition. "This makes FARO 66 a clear alternative for planting in flood-prone areas," said Dr Venuprasad. Even under non-submergence conditions, FARO 66 showed a yield advantage of about 6-11 per cent in multilocation and on-farm trials. It matures a week earlier than its parent.

Similarly, FARO 67 can yield at least 10 times higher than its parent FARO 60 under submergence. Under non-submergence conditions, FARO 67 showed yield advantage of 10-29 per cent in on-station, multilocation and on-farm trials. It was favoured by farmers for its height and larger quantity of biomass that can be used as livestock feed or as mulch to improve crop yields.

The flood-tolerant varieties are a result of precision breeding and are not genetically modified organisms. As they provide farmers with protection against short-term flooding and serve as a type of 'insurance policy,' farmers can feel reassured and invest in agricultural inputs such as fertiliser, leading to higher rice yields.

International support

The partnership with national agricultural systems such as NCRI and NRMC and with international institutes, such as the International Rice Research Institute (IRRI), has been a key factor in the development of the flood-tolerant varieties for Nigeria.

The work on the development of the flood-tolerant varieties for Nigeria was supported by the Bill & Melinda Gates Foundation-funded 'Stress-tolerant rice for Africa and South Asia' project led by IRRI. The Asian SUB1 lines from IRRI were used as donor lines of SUB1 gene as part of this project.

The testing of the flood-tolerant varieties in Nigeria was supported by the United States Agency for International Development-funded 'Seed scaling' project, the African Development Bank-funded 'Support to agricultural research for development of strategic crops in Africa' project and the Bill & Melinda Gates Foundation-funded 'Rapid mobilisation of alleles for rice cultivar improvement in sub-Saharan Africa' project.

The path ahead

The main challenge now is to produce enough quantities of seed of these varieties and distribute them effectively to Nigerian farmers. "There is already a lot of interest in getting seed of the flood-tolerant varieties," said Dr Venuprasad. A roadmap to multiply and distribute seeds to farmers with the help of government agencies and private seed companies is being developed.

The potential for impact of these flood-tolerant varieties is huge in Nigeria, which is the largest producer of rice in West Africa and the second largest importer of rice in the world. Rice is an important food security crop as well as an essential cash crop in the country.

The submergence-tolerant rice varieties are also being tested through the Africa-wide Rice Breeding Task Force for their adaptability to other African countries that are flood-prone. Five potential flood-tolerant varieties are under testing in Madagascar.

Attaining self-sufficiency in rice production is an important goal of many African countries, including Nigeria. The flood-tolerant varieties can contribute to achieving this goal by boosting rice production and helping reduce dependence on costly rice imports.

-AfricaRice

AfDB, Brazil collaborate to train African youth in cassava processing

THE AFRICAN DEVELOPMENT Bank (AfDB) and the Brazil-Africa Institute (BAI) have launched the Youth Technical Training Program (YTTP) an initiative that aims to train young African professionals in research and technology transfer, contributing to local capacity development.

The YTTP initiative is sponsored under the South–South Cooperation Trust Fund (SSCTF) and will consist of an array of professional development schemes to meet diverse needs of African countries by utilising Brazil's technology, skills and knowledge. Focus areas include agriculture and rural development, health, education, information and communication, infrastructure and the creative industry.

As part of this initiative, both parties announced the commencement of training of African youth for rewarding careers in cassava processing.

The first batch of the YTTP training, which was flagged off at the AfDB headquarters in Abidjan, Côte d'Ivoire, targets 30 young African professionals (between the ages of 18 and 35) of the cassava value-chain selected from 14 countries. The trainees will receive a two-month training on the production chain of cassava at the Brazilian Agricultural Research Corporation (EMBRAPA) – a state-owned centre in Brazil.

The cassava training initiative was launched in close collaboration with the Brazil-Africa Institute, the Brazilian Agricultural Research Corporation (EMBRAPA) and the International Institute of Tropical Agriculture (IITA).

Most technologies developed in Brazil, especially those which relate to agriculture, are relevant for Africa. In addition, there is an increasing demand for Brazilian technology applicable to the African context.

Speaking at the launch of the YTTP, the Bank's Director of Agriculture and Agro-Industries, Chiji Ojukwu, explained that the first batch of cassava processing trainees would be for two months.

Cassava cultivation holds great potential for the region. (Photo: tinglee1631)

"The development of the cassava training programme is one of the many programmes of ENABLE (Empowering Novel Agri-Business-Led Employment) Youth Program of the AfDB. There will be more of such programmes to be developed with the Brazil Africa Institute," he said.

The President of the Brazil Africa Institute, João Bosco Monte, was optimistic that the trainees go back to their different counties with sound cassava production and processing training and skills at the end of the two months training.

This year's new and updated combine harvesters offer increased output and efficiency in both rotary and straw walker models. Mike Williams brings you a round up of the latest innovation and developments in the combine harvester market.

Making way for better harvesting

The latest version of New Holland's CR10.90 model has a 700hp engine, making it the most powerful combine currently available. (Photo: New Holland)

A KEY FACTOR AFFECTING harvesting output is the amount of engine power available, and the latest developments from New Holland include an extra 50hp for the flagship CR10.90 model in their CR Revolution rotary harvester series. The CR10.90 is already claimed to be the most powerful combine on the market, and the power boost takes the maximum engine output to 700hp and is one of the specification changes designed to increase productivity by up to 10 per cent. There is also more power for the CR8.80 model, with the maximum output on the 2018 version increased to 517hp

Other CR Revolution developments include new rotor vanes with infinitely variable adjustment controlled from the driver's seat to maintain the maximum flow of crop through the combine. The adjustment system is available as an option on the four models at the top of the range. Also included in next year's CR specification is an improved straw chopping and spreading system with longer knives and a faster rotor speed offering a more even chopping performance and a wider spread.

New Holland has also announced a new cab for its CX5 and CX6 series combines with five and six straw walkers. Said to be the biggest cab available in this sector of the market, design features include a seven per cent increase in the window area for improved all-round visibility.

Many of the new models have been designed to provide increased levels of automation to make it easier for the operator to achieve optimum harvesting performance.

The age of automation

The new arrivals for the 2018 season in the John Deere combine range are four S700 series models with rotary separation. The models announced recently in Europe are the S770, S780, S785 and the S790 powered by John Deere engines with outputs from 449 to 617hp. Grain tank capacities are 10,600 litres on the S770, increasing to 14,100 for the other models, and header recommendations start at 7.6m, with 12.2m suitable for the S790. As well as the previous range of headers, John Deere has also introduced new 700PF Premium Flow series headers with high capacity 760mm intake augers.

Developed from the S600 range, the new models have been designed to provide increased levels of automation to make it easier for the operator to achieve optimum harvesting performance. Features added to the John Deere Combine Advisor package are extended to cover automatic adjustment of the threshing and cleaning systems to maintain output levels previously selected by the operator, compensating for changing crop and harvesting conditions. The Combine Advisor equipment also includes two ActiveVision cameras allowing the operator to use the in-cab display to maintain a visual check on the tailings and clean grain elevators. Data from the cameras plus information from the grain loss sensors is also constantly analysed to optimise the combine's threshing, separating and cleaning performance.

Also available on John Deere's S700 series is the award winning Active Yield system offering a big advance in yield mapping accuracy. Active Yield uses three weigh cells inside the grain tank to measure

LEMKEN Achat 70

Intensive Cultivator

For years LEMKEN has been a leader in cultivator development, and many commercial farms have benefitted from the unique mixing and loosening action from LEMKEN cultivators. Now LEMKEN is offering these benefits to Africa's smaller farmers with the Achat 70. Due to the steep angle of the tine and the unique shares from LEMKEN, the Achat 70 can loosen the soil and mix in plant residue at the same time without plugging. Added to this, the following roller ensures for a level seedbed for optimal growing conditions.

3 benefits of working with the integrated roller on the Achat 70

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2 Conserves moisture...
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the weight change as the tank fills, and for increased accuracy the system automatically compensates for moisture sensor readings and for grain movement in the tank when harvesting on slopes.

Refining the rotary threshing technology

Case IH pioneered the development of rotary threshing technology with a single rotor system with its first Axial-Flow combines introduced more than 30 years ago. Since then the success of the Axial-Flow harvesters established rotary combines as an alternative to the straw walker system. The newest addition to the Axial Flow range is the 9240 flagship model announced recently at the NAMPO event in South Africa. It is mounted on rubber tracks to reduce ground pressure and soil damage in soft ground conditions, and the tracks have a special suspension system to provide the flexibility to follow an uneven ground surface.

Existing Axial-Flow combines are available in the high output 240 series with maximum power outputs in the 498hp to 634hp range, and there are three models in the mid-range 140 series which have recent specification updates including engine refinements providing increased power and improved fuel efficiency. The 140 combines are the 5140 with up to 299hp available, the 6140 engine delivers 417hp maximum output increasing to 448hp for the flagship 7140 combine, and all three models have a hydrostatic transmission providing infinitely variable travel speed in three ranges. Grain tank capacities are 10,570 litres on the top two models, and the tank discharge rates are 88 litres per second for the 5140 and 113 l/sec for the 6140 and 7140.

A special feature of the Case IH range is the comprehensive choice of headers covering virtually all combining applications.

A special feature of the Case IH range is the comprehensive choice of headers covering virtually all combining applications, and for the 140 series combines these include corn headers in six, eight and 12-row sizes for 70, 75 and 80cm row widths, there is a choice of 4.9m to 12.5m widths for the 3050 series grain headers, and pick-up headers are available for previously windrowed crops.

Greater efficiency with automation

With 80 years of combine harvester production and sales totalling more than 50,000 machines, the Claas company has a long term record of success and its most recent developments are centred on the Lexion 600 series straw walker models. The 600 series consists of five models with engine outputs from 313hp to 435hp and grain tank capacities between 9000 and 11,000 litres. The top three models have six straw walkers and there are two with five straw walkers. Two of the models can be supplied as hillside machines with a Montana specification and the top two 600 series harvesters can be equipped as Terra Trac versions on rubber tracks.

The latest specification updates introduced for this year's harvest are designed to improve efficiency and they include increased automation to help maintain optimum performance levels. An example is the Claas Auto Crop Flow Control added to the options for 600 series Lexions, based on sensors that check engine speed, major threshing functions and the straw chopper. These detect signs of a build-up to a blockage. If this happens the cutterbar and crop feed stop automatically to allow excess material in the combine to clear. Also on the automation options list is the Auto Slope control that automatically adjusts the fan speed while the combine is working on a gradient, maintaining a consistent sample with reduced grain losses. This control is also available with additional crop flow sensing that can be used to maintain the preferred performance balance between fuel economy, grain or straw quality and throughput.

The top two models in the Lexion 600 series have dynamic cooling, a feature already used on Lexion 700 series combines. Dynamic cooling uses a variable speed drive to the engine cooling fan with a control that automatically adjusts the cooling capacity to match the engine's actual requirement as the work load changes. The main advantage is a potential 20 per cent engine speed reduction resulting in fuel cost savings.

The S790 is the top model in John Deere's S700 combine series with a 617hp engine. (Photo: John Deere)

The 7140 combine is the top model in the Axial-Flow 140 rotary harvester series from Case IH. (Photo: Case IH)

Catering to higher output demands

Full details of the newest addition to the Massey Ferguson combine range for the 2018 harvest year are still on the secret list, but it is expected to be a high output model designed for contractors and the biggest farms. Meanwhile, the top model in the Massey Ferguson harvester range is the

The latest Claas models are the result of 80 years of combine harvester production with more than 50,000 machines sold. (Photo: Claas)

Delta 9380 combine powered by a 496hp AGCO engine and equipped with an unusual threshing system that combines both rotary and conventional threshing systems. The design features helped the Delta to win the international Machine of the Year award in 1914, and the specification includes a rotor with 200mm diameter, grain tank capacities are 10,500 or 12,500 litres and the Massey Ferguson Premium Powerflow header is available in 9.2m and 10.74m widths and uses a belt drive to take crop material in a heads-first arrangement into the threshing mechanism. Discharge rate for emptying the grain tank is 120 litres per second and the equipment list includes Auto-Guide steering plus a GPS linked system for handling and transmitting working information including yield map data.

While much of the emphasis in the Massey Ferguson combine range is on the high output sector of the market, there are also plenty of harvesting options for smaller farms. The range starts with the two Activa series models with five straw walkers designed to work with header widths between 4.2m and 6.6m. The MF7340 Activa model has a 176hp engine and a 5200 litres grain tank capacity, with 218hp and 6500 litres for the MF7344, and the standard transmission for both models is hydrostatic with three speed ranges.

Massey Ferguson's Delta 9380 combine has a 496hp engine and the grain tank holds up to 12,500 litres. (Photo: Massey Ferguson)

Innovations in small to medium scale harvesting

The most recent addition to the Deutz-Fahr combine range for small to medium scale harvesting is the C6000 series with five straw walkers and a 250hp engine powering a hydrostatic drive system with three speed ranges. The C6000 is available with the choice of four header widths ranging from 4.2m to 6.3m using a Schumacher cutterbar with 1220 cuts per minute knife speed. The threshing system includes a 600mm diameter drum with eight rasp bars and the grain tank holds 7000 litres. It has a 75 litres per second discharge speed and it has sensors providing both visual and audible warnings for the operator when the tank is full.

The medium capacity Deutz-Fahr C6000 series combines have a 250hp engine and a 7000-litre grain tank. (Photo: Deutz-Fahr)

For its entry-level combine the Deutz-Fahr range features the C5000 series consisting of two models. Both have a 6.1 litre engine with power outputs of 16hp for the C5205 version, increasing to 180hp for the C5305. Header widths of 3.6 and 4.8m are available, both using the Schumacher knife system, and the drum diameter is 600mm. The tank capacity is 4600 litres and the standard 4.0m discharge auger can be replaced by a 5.0m version to allow unloading into high sided grain trailers.

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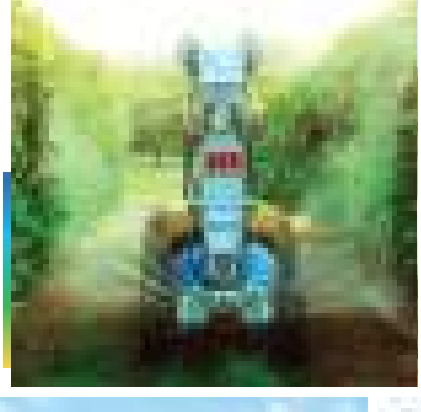

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Via Fermi, 63 - Zona Industriale Lugo 1
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Re-imagining farming with innovations in agri-machinery

THE TREND TOWARDS further automation of processes – coupled with intelligent data management systems to optimise the regulation and control of equipment, logistics, documentation, quality assurance and traceability – is proceeding unabated in agriculture. This is demonstrated by the more than 320 new product registrations the DLG (German Agricultural Society) has received for this year's Agritechnica.

The terms Cloud Computing and Big Data have entered the common parlance, and in addition to 4.0, the digitisation and networking of the value chain in agriculture is becoming increasing important. It is appropriate, therefore, that a Gold Innovation Award at Agritechnica 2017 went to the first fully automatic tangential threshing system that uses sensors to adjust itself to suit crop conditions and achieve optimum results.

Cemos Auto Threshing – automatic threshing control for CLAAS straw-walker and hybrid combine harvesters. (Photo: CLAAS)

Global agriculture is moving steadily towards further automation of processes – coupled with intelligent data management systems to optimise the regulation and control of equipment, logistics, documentation, quality assurance and traceability.

Classic engineering, however, continues to result in products with benefits for the entire agricultural sector, and this year's second Gold Innovation Award went to a maize header with an integrated stubble mulcher. This development helps control the corn borer, a significant pest affecting maize crops, and results in an overall reduction in the use of pesticides.

Elsewhere in the awards, there was a clear trend towards adapting existing, innovative solutions already used in other industries so they can be used in agriculture. Examples include Silver Innovation Awards for e-mobility, a height-adjustable operator's cab, intelligent networked vehicles and augmented reality applications.

Among the other targets of new and further developments that received special appreciation from the DLG Innovations Jury were new ways of making operators' jobs easier. Thanks to innovative solutions, there has been a continuing reduction in long hours of monotonous, very tiring and complex work for operators, and these tasks will eventually be taken over entirely by the new technologies.

Overall, the DLG Innovations Jury recognised two innovations with the Agritechnica Gold Innovation Award 2017, and 29 innovations with the Agritechnica Silver Innovation Award 2017.

Autonomous threshing system from CLAAS

Cemos Auto Threshing – the autonomous threshing system for CLAAS straw-walker and hybrid combine harvesters has been awarded a Gold Agritechnica Innovation Award.

Currently operators have to find out by themselves which settings strike the best balance between the optimum drum speed, the optimum concave gap, the suitable aggressiveness of threshing and the quality of the grain. Some operators find this complexity too difficult to come to terms with, and find setting up the combine a chore. Consequently, very often a combine is not set up perfectly to suit the current harvest conditions.

Cemos Auto Threshing is the first system that sets the tangential threshing system on straw walker and hybrid machines automatically. As such, it makes a significant contribution to optimising the quality of work and performance. Depending on the strategy entered into the system by the operator, it sets the drum speed and the concave gap for optimum results in the current harvest conditions. The USP of the entire system is the fact that all controllers communicate with each other. For example, the throughput controller operates via a special communication module to control the throughput relative to the threshing controller, as well as the separation and cleaning controllers.

Another module in the system is auto threshing, which for the first time completes the enormous complex technical step to

implement fully automated threshing. On such a harvester, users no longer need to know which settings they have to make to get the desired results. Instead, they enter the harvesting strategy, which is then used by the auto-learning system to optimise all parameters. This automation allows combine harvesters to work at maximum efficiency.

Kemper StalkBuster: maize header with stubble-destroying technology

Since the corn borer spread across Germany about 15 years ago, it has become the most notorious pest in silage maize crops in the country. It causes losses in yield and quality, because the cobs do not develop well, and they become infested with Fusaria which may then spread to the following wheat crop. One of the most important methods to fight the pest, along with chemical and biological options, is to chop the maize stubble thoroughly and immediately after the crop is harvested.

The Kemper StalkBuster is the first stubble-destroying technology that forms an integral part of a maize header. It is the only machine on the market that destroys all the stubble before it is driven on by the forager or the tractor and trailer. Usually about 30 per cent of the stubble remains intact, and as the corn borer winters inside it, a high percentage of undestroyed stubble offers them a haven so they can infest the area again the following year. The corn borer pupates in the stubble in spring and the moth starts infesting the new crop after that.

Kemper's The Stalkbuster allows for controlling corn borer without plant protection agents. (Photo: Kemper)

The topper is integrated in the header, is relatively lightweight and has a relatively low power input requirement. This means no extra limitations apply for legal road transport. The Kemper StalkBuster is a technical solution that offers great benefits for users, their productivity and the environment.

The silver category of the awards also present a wide array of innovations across sectors. A few of them include e100 Vario by AGCO – the world's first battery-powered tractor, camera supported seedbed preparation by Pöttinger, Flexwave grain silo unloading system by GSI Hungary, Mobile Agricultural Robot Swarms (MARS) by AGCO– the first marketable application of swarm technology in agricultural engineering and automation of agricultural recordings with smartphones by Farmdok.

PÖTTINGER launches plough series for tractors between 140 and 240 hp

PÖTTINGER HAS LAUNCHED the SERVO 45 M plough series, which feature user-friendly mounted ploughs, especially developed for the 140 to 240 hp class.

These new mounted reversible ploughs will be available in December 2017 as 4-furrow and 5-furrow models. These ploughs are offered as PLUS (with hydraulic furrow width adjustment), NOVA (with hydraulic trip legs and a triggering pressure of 1,900 kg) and NOVA PLUS versions.

The hydraulic overload protection of the NOVA trip leg system offers an adjustable triggering pressure of up to 1,900 kg to protect the plough against damage and ensure non-stop ploughing.

The new series is available with an interbody spacing of 95 cm or 102 cm and an under-beam clearance of 80 cm, or 90 cm as an option.

The geometry of the new SERVO 45 M plough has been designed to precisely match the dimensions of new tractors. (Photo: PÖTTINGER)

The Traction Control expansion module enables the weight of the SERVO 45 M to be transferred to the tractor. Transmitting force through the traction system optimises the ground tracking of the plough while applying a permanent load to the rear wheels of the tractor.

Wheel slip is minimised and fuel consumption reduced by up to two litres per hectare. In addition, harmful smearing of the rear wheels is reduced and the soil protected. At the same time Traction Control enables improved ground tracking and therefore a more uniform working depth compared to conventional systems, because the top link pin can operate permanently in a slotted hole.

According to the company, the new model also eliminates the need for ballast on the rear wheels of the tractor: a front ballast weight is enough because the weight of the plough is transmitted so that the rear tractor wheels are under constant pressure. There is no increase in axle weight when driving on the road, as would be the situation with wheel ballast.

The weight applied to the rear axle of the tractor is infinitely variable and can be adjusted hydraulically between 600 and 1,500 kg without leaving the cab.

Case IH's new training academy aims to improve Zimbabwean agricultural productivity

THE CASE IH Training Academy, a new initiative to encourage best practice in Zimbabwean agriculture, was officially opened in Chinhoyi last week by Matthew Foster, vice president in charge of agricultural commercial development for Europe, the Middle East and Africa. With support from Case IH, the Academy will provide hands-on technical and operational training to help farmers improve productivity through the wider adoption of mechanisation. At a time when Zimbabwe is striving to improve agricultural productivity to regain food self-sufficiency, the Academy is expected to play an important role.

The official opening ceremony was attended by more than 100 visitors from Zimbabwe, Botswana, Zambia, South Africa, Kenya, Sudan and Egypt. Guests included farm operators, agricultural equipment dealers and distributors, directors and senior managers of Case IH, and senior representatives of Case IH's Zimbabwean distributor Agricon Equipment.

With 2,000 hectares of land, mostly dedicated to maize and wheat, the training academy is owned by local farmers in Mashonaland West Province and leased and operated by BlueSky Farms.

Case IH's AF7140 combine harvesters featuring advanced Axial-Flow single rotor technology on display at the show. (Photo: Case IH)

Training activities at the farm will be run in partnership between BlueSky, Case IH and Agricon.

To enable farmers to gain or strengthen a wide variety of skills, the academy gives access to an impressive array of Case IH agricultural equipment. This includes a JXT 75 utility tractor; high-horsepower Puma 210 multi-purpose tractor; state-of-the-art Magnum Rowtrac 380 CVXDrive tractor with continuously variable transmission and tracks in the rear; industry-leading Axial-Flow 7140 rotary combine harvester; Patriot 3230 sprayer; and a 24-row Early Riser seed planter.

"We hope that in our future provision of training and education to local farmers, we can contribute to a more productive Zimbabwe," said Jason Smith, chief operating officer of Agricon Equipment.

CLAAS launches new AXION 800 series tractors

TRACTORS IN THE AXION 800 series from CLAAS feature a wide range of models and engines from 205 to 295 hp (in accordance with ECE R 120) and are designed for many different applications. This is the latest generation of the AXION 800 series with enhanced equipment options and many practical solutions that were initially introduced in the new ARION 600/500 and AXION 900 series. These include the new CEBIS system with colour touch display and CMOTION multifunction control lever, the new CIS+ specification option and air brakes with an air dryer.

In addition to the basic CIS and the new touch-screen CEBIS systems, new AXION 800 models are now available for the first time with CIS+, giving three equipment options. Like CEBIS, the CIS+ system introduced with the new AXION 900, ARION 600 and ARION 500 tractors are extremely user-friendly, offering a high level of convenience with reduced complexity. The features within CIS+ include the CIS colour display and the proven multifunction armrest with ELECTROPILOT four-way control lever and DRIVESTICK to operate the transmission.

The universal hitch support in the new AXION 800 series allows up to six different traction devices to be used. (Photo: CLAAS)

The CEBIS system includes the new, high-resolution CEBIS terminal with 12-inch touch display and an ergonomic armrest with CMOTION multifunction control lever for convenient operation of all the main functions using the thumb and first two fingers. The armrest now also offers a total of 10 freely configurable function buttons. Eight of these buttons are on the multifunction control lever and can be configured, for example, with various ISOBUS functions. The intuitive operating structure is based on the existing CEBIS generation and has been further optimised for touch display use. Features include the quick-adjustment facility for frequently-used tractor functions using DIRECT ACCESS, which is operated simply by tapping the machine silhouette on the CEBIS touch display. When working on uneven terrain, all the settings can still be entered using the familiar rotary/push switch with ESC button.

All tractors in the new AXION 800 series have a universal tow hitch support which conforms to ISO 500. This allows problem-free use of the hitches from the new AXION 900 series tractors and other manufacturers with compatible standards. The tow hitch support also comes as standard with a long mounting rail and a slot for traction devices in the drawbar.

World's first self-propelled round baler introduced

VERMEER HAS INTRODUCED what it is describing as the world's first self-propelled round baler. Unveiled at Husker Harvest Days, the prototype ZR5 self-propelled baler promises to make quick work of any field while offering unprecedented ride quality and maneuverability.

"Our patent-pending suspension technology allows operators to better handle the bumps and jostling that naturally comes with baling hay. If you think about all those bumps over the course of the day or multiple days, ride quality can really impact the operator," said Josh Vrieze, product manager. "In the ZR5, operators experience a smoother, more comfortable ride with the cab uniquely positioned over the suspension."

The company has applied zero-radius turning to the steering system in the self-propelled machine. This feature allows operators to gain better maneuverability and driving efficiency than

Prototype of the ZR5 round baler. (Photo: Vermeer)

a conventional tractor-baler combination.

"Operators can spend less time turning in the field and more time baling. The zero-radius turning can eliminate skipping a windrow to make the turn, or swinging out wide to get into the next windrow," Vrieze pointed out. "And, when it's time to head to the next field, zero-radius turning can be disengaged.

While still a prototype, automating the baling process, as well as providing the ability to automatically make real-time adjustments based on field, crop and operator inputs, are just a couple of the goals Vermeer has for the ZR5. Integrated quarter-turn technology is part of the ZR5 baling automation process. During the tie-cycle, the machine can automatically rotate to the left or right, positioning the bale parallel to the windrow upon ejection. When placing bales parallel to the windrow, the picking up process can be completed up to 35 per cent faster.

The company commented that keeping machine maintenance simple is another objective it is aiming to achieve. The bale chamber of the ZR5 can be removed for maintenance easily, helping to ensure producers are spending time productively in the field.

New Holland unveils concept tractor powered by methane

NEW HOLLAND AGRICULTURE presented the latest development in its vision for the sustainable future of farming at the Farm Progress Show – a methane powered concept tractor that reimagines the design of this machine.

The brand imagines the farm of the future as being completely energy independent: a farm that produces not only food, but also the biomass it needs to generate the energy it uses to run its operations and power its tractors and other machinery. According to New Holland, such a self-sufficient future is achievable today, its advanced technology and vision.

New Holland Agriculture brand president Carlo Lambro commented, "The new methane powered concept tractor is the latest development in New Holland's pursuit of sustainable and efficient technology through innovation. Its groundbreaking engine delivers the same performance and has the same durability as its standard equivalent, but

The methane powered concept tractor is expected to reduce overall emissions by 80 per cent compared to a standard diesel tractor. (Photo: New Holland)

with much lower running costs. It combines alternative fuels and advanced agricultural to create a vital link that closes the loop in the Energy Independent Farm's virtuous cycle by running on the energy produced from the land and waste products."

The new methane powered concept tractor builds on the foundations of the previous T6 Methane Power prototypes to achieve a significant technological advance. It features a powertrain that uses a groundbreaking efficient combustion technology specifically developed for agriculture applications by FPT Industrial, a brand of CNH Industrial that has pioneered natural gas traction for more than 20 years. The six-cylinder NEF methane engine delivers 180 hp and 740 Nm: the same power and torque as its standard diesel equivalent. It has the same durability and service intervals, and generates up to 30 per cent running cost savings.

The powertrain of the concept tractor has the added benefit of quiet operation, with engine noise level reduced by up to 3 dBA. This translates to around 50 per cent reduction in drive-by-noise, makig it ideal for municipality, yard and transport operations. In real field conditions, the methane powered concept tractor produces at least 10 per cent lower CO_2 emissions.

AGCO introduces new agribusiness qualification

AGCO, YOUR AGRICULTURE Company, has signed a MoU to inaugurate a new agribusiness course aiming to fill junior management roles in African agriculture and the supply chain, thus upgrading the continent's skill resources.

New AGCO agribusiness qualification is set to develop skills, leadership and strategic expertise to drive African agricultural prosperity. (Photo: AGCO)

AGCO has partnered with Strathmore Business School (SBS) in Kenya, Harper Adams University in the UK and Kenya-based The Bridge Africa for the AGCO Agribusiness Programme (AAP) which will prepare graduates for employment, said the company.

The demand for agriculture to produce more food is driving the pace of change in farming practices in Africa. The AAP is open to students throughout Africa and is expected to address the need to bring young talent into the agribusiness sector in the entire region.

Nuradin Osman, vice-president and general manager of AGCO Africa, said that this comprehensive new programme will focus on meeting the challenge to establish a long-term commitment to skill-development in the continent.

The programme is set start in March 2018, and will deliver an accredited two-year agribusiness programme through SBS in Nairobi, Zambia and South Africa for up to 25 students aged 20-30, leading to potential job opportunities within AGCO Africa.

To take it forward, the aim is to extend the program and offer the course using remote and blended learning techniques.

"This is a strong business-oriented program that will provide training in critical skills and develop leadership and strategic expertise to drive African agricultural prosperity," explained Osman.

"It underlines our approach to ensure Africa is run from Africa. Upon completion of the course, students will have the opportunity to be placed within the AGCO Africa organisation, thus providing excellent job prospects. It is a win-win situation for all those involved," he explained.

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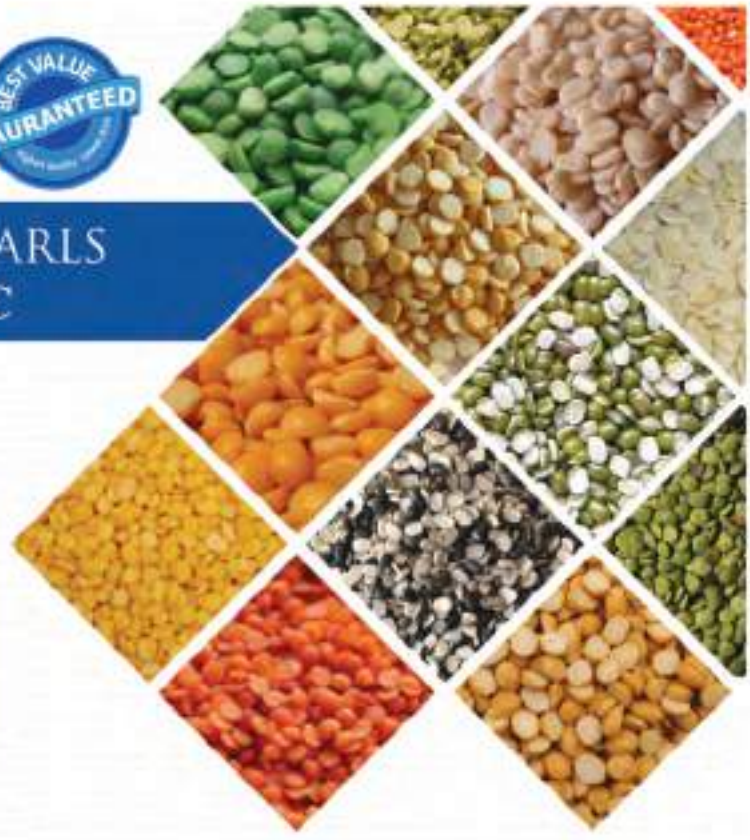

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