

African Farming

and Food Processing

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Mowers

Latest innovations

Tea plantations

Better yields with sulphur

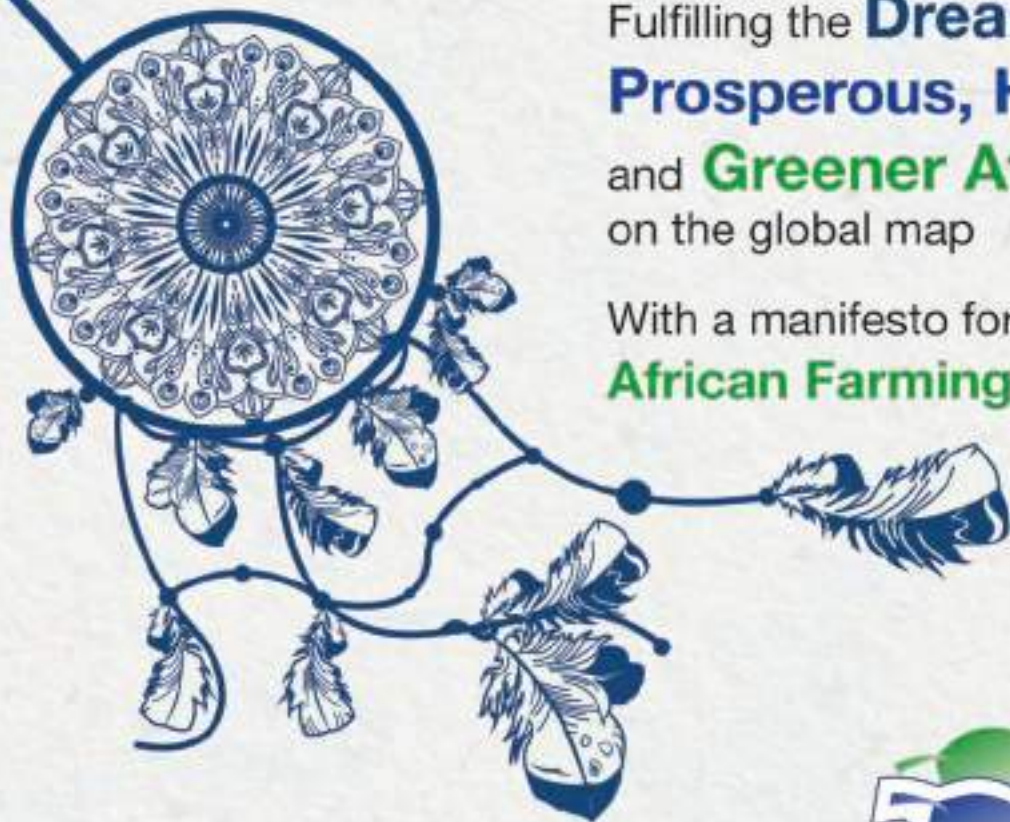
Rice cultivation

Conservation farming for improved results



Chisamba prepares for the fifth Agritech Expo Zambia. p10





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Latest innovations



Image Credit: ahavalaar/AdobeStock



Baldan's CRSG- wheel type offset remote control disc harrow is one of the most popular products in the market. p26



Tea processing involves fresh green leaves being put through a series of exhaustive processes including withering, rolling, fermentation and firing. p18

African Farming and Food Processing

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Farming Calendar 2017

MARCH

14-16	HortiFlora Expo www.hppexhibitions.com	ADDIS ABABA
27-28	Smart Agri Congress Africa https://www.smart-agri-congress.com	Nairobi, Kenya
27-29	3rd Global Dairy Congress Africa www.szwgroup.com/global-dairy-congress-africa-2018	NAIROBI
27-29	Agrofood Nigeria www.agrofood-nigeria.com	LAGOS

APRIL

05-07	NIPOLI Expo www.nipoliexpo.com.ng	IBADAN
12 - 14	Agritech Expo Zambia www.agritech-expo.com	CHISAMBA
17-19	Fresh Produce Africa www.hppexhibitions.com	NAIROBI
25-26	Aviana Nigeria www.avianafrica.com	IBADAN

MAY

15-18	NAMPO Harvest Day www.grainsa.co.za	BOTHAVILLE
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JUNE

04-06	African Farming's Agroinvestment Summit www.agroinvestmentsummit.com	LONDON
20-22	Agritec Africa www.agritecafrica.com	NAIROBI

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

Spotlight on Ethiopia's horticulture and floriculture industries

THE ETHIOPIAN HORTICULTURE & Floriculture Industry has developed into a full grown player and put itself on the world map as one of the leading exporters of cut flowers in the past 15 years. The area for greenhouses grew in the same period with an average of about 50 ha per month. Consequently exports accelerated the need for airfreight capacity considerably and the process of accomplishment is well on track. It can be said that the Ethiopian government - by putting a lot of emphasis on the development of the Ethiopian floriculture and horticulture industry - is responsible for a great deal of this enormous achievement.

Besides the Ethiopians themselves, other players, in particular the Israeli and Dutch growers have made big efforts to establish horticulture and floriculture businesses in Ethiopia in recent years. As far as the floriculture sector is concerned, Ethiopia went through a similar development as Ecuador in 1992. Although the circumstances were not exactly the same, there are many parallels. To name a few: climate, altitude, landscape and proximity of an international airport in relation to the location of the flower farms, are circumstances that one can also find in Ecuador, a country that also developed a highly successful export industry of cut flowers. HORTIFLORA EXPO 2018, taking place from 14-16 March 2018 at the Millennium Hall, very close to the international airport, for the sixth time as a Biennial Trade Fair, will put Ethiopia's booming flower industry on focus. This venue has been found to be an excellent location to promote Ethiopia's floricultural and horticultural industries, the organisers said.

The expo will not only serve as a platform for exhibiting national and international suppliers who want to meet Ethiopian growers, but as well for exhibiting Ethiopian growers who want to meet international buyers of flowers and fresh produce.

Production of vegetables and fruits still takes place on a modest scale, but is momentarily growing rapidly as well. Therefore, HORTIFLORA EXPO 2018 will also include these two horticulture sectors in its exhibitor and visitor profile.

Supporting the growth of agriculture and agribusinesses in West Africa

AFRICAN FARMING, IN association with 151 Products Ltd, will organise the African Farming's Agroinvestment Summit in London from 4 -6 June 2018, with the aim of supporting the growth of agriculture and agribusinesses in West Africa.

The event will be attended by a wide range of stakeholders like government officials, importers, distributors, agribusiness owners, C-level executives from food companies, trade union members and manufacturers and suppliers of agricultural equipment, machinery and services.

More than 450 global CEOs in agro-food and allied industries from Europe, Asia and Africa are expected to attend the event. It is set to create a cohesive platform for trade and investment opportunities, attracting major investors and buyers from around the globe.

Market opportunities for the West African agriculture and food market are increasing due to the population growth, urbanisation, income growth and higher output services. On an annual basis, more



The event aims to attract major investors and buyers from around the globe.

than US\$10bn is committed across West Africa in agricultural development, food, beverage products and services.

With this in mind, Victor Mayomi, minister of

agriculture and rural development in Nigeria, said, "We are confident that several new relationships would arise from the networking interactions amongst participants."

New programme to encourage better RTB variety in Africa

THE RTBFOODS PROJECT (Breeding RTB Products for End User Preferences), launched in November 2017, is a five-year effort created to isolate the quality traits that determine the adoption of new root, tuber and banana (RTB) varieties developed by breeders. The US\$14.3mn project will take a novel approach involving consumers, processors and researchers, and will eventually serve to boost food security.

In the field of crop improvement, a variety is considered optimum, or elite, when it gives good yields, is well suited to the soils on which it will be grown, and is resistant to pests and diseases or to the vagaries of climate change. However, these criteria alone will not ensure that farmers and consumers will adopt it.

"When we look at plantains, yams, sweet potatoes, potatoes or cassava, it is clear that the 'elite' varieties produced by breeding programs are not popular with farmers or other value chain stakeholders,"



The programme will help farmers to improve their production of cassava and other tubers.

Image Credit: Patarapong/AdobeStock

explained Dominique Dufour, a CIRAD researcher specialising in cassava.

The problem is that breeders lack access to the selection tools to evaluate end-user quality traits and adjust their new varieties to local preferences. Just as there are potato varieties for making chips and others more suitable for mashed potato, some tropical roots and tubers varieties have specific uses. For instance, making cassava fufu involves

several operations such as fermenting, peeling, removing the fibres, etc. However high-yielding a new variety is, if it does not ferment well or if it complicates fibre removal, it will not be adopted.

"These quality traits depend on genetics, and also on the environment: they are not easily addressed in improvement programmes. Over the years, CIRAD researchers have gradually developed rapid methods to assess complex quality traits. This expertise has now been acknowledged by the Bill &

Melinda Gates Foundation, which has asked us to coordinate the RTBfoods project," Dominique Dufour added.

This project will serve to link local consumer preferences with quantitative quality criteria, before integrating these criteria into breeding programmes. The aim is to ensure more widespread adoption of improved varieties, hence boosting food security and farmers' incomes.

Malawi farmers receive pesticides to fight fall army worms

AMIDST FEARS OF low yields this year due to fall army worm attack and dry spells in some parts of the country, the Ministry of Agriculture, Irrigation and Water Development has started distributing pesticides to farmers in Mulanje District.

District Agricultural Development Officer (DADO) for Mulanje, Enford Kanyimbo said in an interview that the pesticides would help farmers who have been affected by the attack save their maize crops so they can still realise good yields. He said currently the situation of the attack in the district is under control, saying farmers in the should have nothing to worry about.

"Indeed we have received 1025 litres of the pesticides which we are going to distribute across the district. This activity is going to take

place on one selected day to make sure farmers spray their fields at the same time to avoid the worms from transferring from one field to another," explained Kanyimbo.

Kanyimbo said the ministry provided 760 litres while the rest was provided by World Vision International and One Hacre Fund.

The fall armyworm (*Spodoptera frugiperda*) is an insect-pest which causes major damage to more than 80 crop species, including economically important crops, such as maize, rice, sorghum, wheat, sugarcane, several other vegetable crops and cotton. It was first officially reported in Nigeria in early 2016, and since then, has been officially confirmed in 11, and suspected in at least 14 other African countries.

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US\$10mn emergency response fund released in Ethiopia

EMERGENCY RELIEF COORDINATOR and under-secretary-general for humanitarian affairs Mark Lowcock has released US\$10mn from the Central Emergency Response Fund (CERF) to urgently help the most vulnerable people displaced in Ethiopia due to the conflict along the borders of the Oromia and Somali regions. Following the escalation of conflict along the Oromia and Somali regional borders in early September, hundreds of thousands of vulnerable people have been driven from their homes and are now living in approximately 370 sites, with needs that are far greater than the response that has been able to be provided so far. The government is now taking the lead in the response efforts and is taking steps to provide life-saving food assistance to those in need.

KBR wins contract for Nigerian ammonia plant

INDORAMA ELEME FERTILIZER & Chemicals and Toyo Engineering have awarded KBR a contract for the Train 2 ammonia plant at Indorama's Port Harcourt site.

In a boost to the Nigerian petrochemicals sector, the plant will be Indorama's second ammonia facility. Under the terms of the contract, KBR will provide technology licensing, basic engineering design, proprietary equipment and catalyst for the plant.

"We are privileged to have the opportunity to work with Indorama and Toyo on Indorama's second fertiliser complex in Nigeria," said John Derbyshire, president at KBR Technology & Consulting. "This contract builds on our long-established relationship with Indorama and Toyo and further highlights our clients' trust in KBR's technology," he added.

World Bank investment helps scale up West African agricultural research

A NEWLY PUBLISHED status report by ASTI's Gert-Jan Stads and Nienke Beintema, has found that the West Africa Agricultural Productivity Programme (WAAPP) is helping west African countries to perform high-quality, production-boosting agricultural research. Since 2008, this World Bank initiative has invested significantly in agricultural research infrastructure and human capacity in addition to supporting regional and cross-country collaboration.

The status report was based on new detailed agency-level data from the World Bank on the allocation of WAAPP funding and WAAPP-funded staff training.

Agricultural research in West Africa remains severely constrained by underinvestment and poorly maintained infrastructure. In addition, in nearly all countries in West Africa, the majority of PhD qualified researchers will retire by 2025, leaving research institutes without a critical mass of senior researchers to lead programmes and mentor junior staff. Stads and Beintema found that, overall, the financial support



Agricultural research in West Africa remains severely constrained by underinvestment and poorly maintained infrastructure.

provided by WAAPP made substantial headway reversing these challenges.

WAAPP has upgraded research stations, laboratories, offices, field infrastructure, and staff residences to improve infrastructure and has equipped research centres and laboratories with state-of-the-art facilities; and has invested in broadband internet, generators, and vehicles. To enhance human capacity, the programme has funded postgraduate training of more than 1,000 young scientists across the region, 30 per cent of whom are female. The programme has also

established national centres for excellence for specific commodities to maximise scarce resources, avoid duplication, and produce regionally relevant research.

As valuable as WAAPP has been for the region, there is still room for improvement. The national centres of excellence tend to focus on preselected commodities—such as rice, maize, and wheat—and overlook regionally important "orphan crops" such as yams in the tropical zones of West Africa and cowpea in the Sahel.

In addition, more efforts are needed to scale up farmers' adoption of new technologies – essential to meeting the food and nutritional needs of the region's full population.

After nearly ten years, the World Bank is preparing to wind down WAAPP and build on its achievements with a new West Africa Agricultural Transformation Programme (WAATP), focused on the uptake of climate-smart technologies. A key question that persists is how West Africa can maintain the successes that these externally-funded projects bring.

Super crops to boost food production in Africa

UK SCIENTISTS ARE leading new cutting-edge research to create crops that are more nutritious, more resistant to disease and better able to withstand severe floods or drought in Africa, in addition to developing medicines to protect farmers' livestock from devastating disease. The programme aims to help up to 100 million African farmers lift themselves and their families out of poverty, in turn building stability and prosperity, which will help African countries become trading partners with the UK in the future.

International development secretary Penny Mordaunt said, "Unpredictable flooding, plant diseases and drought are threatening the lives and livelihoods of millions of farmers in Africa who struggle to grow enough crops to put food on the table – the urgency of the

task is clear. That's why UK aid is supporting British scientists to develop new crops that are more productive, more nutritious and more resistant to droughts and flooding, as well as creating new medicines to protect cattle and poultry from devastating disease."

The scientists are also leading ground-breaking work on diseases which cause huge economic losses for African farmers, including animal African trypanosomiasis (AAT), a disease which kills over three million cattle a year, has been estimated to cost over US\$4bn a year in total to African economies and can cause sleeping sickness in people.

Scientists believe that within the next five years – and for the first time in over 40 years – a new drug will be available to treat AAT.

AfricaRice and CNRA strengthen capacity of women rice processors in Côte d'Ivoire

AFRICARICE RESEARCH STATION in M'bé near Bouaké conducted a training course on the use of the GEM rice-parboiling system for women rice processors from Bouaké and Gagnoa, Côte d'Ivoire.

"Everything that we have learned here about parboiling is new for us. We will use this knowledge and the GEM technology to produce high-quality parboiled rice and we hope that one day we can invite our President to relish our parboiled rice," said Mrs Camara Assetou, head of the women's cooperative SCOOPS FG, Bouaké.

The training was the direct result of a consultation meeting held by AfricaRice, CNRA and ANADER with rice value-chain players in Bouaké and Gagnoa in May 2017, during which rice parboiling was identified as an important activity performed by women groups. It was also clear from the consultation meeting that the women processors were using rudimentary methods and equipment, leading to very poor quality parboiled rice

Based on the feedback from the consulta-



Women rice processors being trained in the GEM parboiling technique.

tion meeting, AfricaRice in partnership with CNRA organised the training course on improved rice parboiling technology to strengthen the capacity of selected women rice processors, who would serve as resource persons and trainers of their peers.

The training was led by AfricaRice grain quality and postharvest technology scientist Dr Sali Ndingeng. The sessions were chaired by CNRA representatives, Prof Jean Nemlin,

director of research and lead of CNRA post-harvest technologies and Central Laboratories and Dr Ernest Depieu, systems agronomist.

The main objectives of the course were to train the women on the use of AfricaRice's grain quality enhancer, energy-efficient and durable material (GEM) rice-parboiling system to improve the quality of rice and fuel-use efficiency; the use of rice husk as an alternative to wood fuel for rice parboiling and the initiation of innovation platforms to link farmers, parboilers and millers in the respective zones.

The training course included both seminars and hands-on opportunities for all trainees. The topics covered include, among others, general introduction to rice grain quality; role of parboiling in improving rice grain quality; introduction to GEM; use of rice husk as fuel and innovation platforms.

The practical sessions included all the stages of GEM technology from washing, soaking, parboiling, drying and milling rice as well as the use of the rice husk gasifier.

Image Credit: AfricaRice

Automated weather stations to help Ethiopian herders

AUTOMATED WEATHER STATIONS (AWS) are being installed in some of Ethiopia's lowlands to help herders and other climate-vulnerable residents respond better to recurring shocks related to climate change.

The project Market Approaches to Resilience (MAR) is led by the NGO Farm Africa in three Ethiopian regions - Afar, Southern Nationals People's Region State and Somali regions - in response to increasing climate variability facing lowlands communities.

Negusu Akilu, MAR's project head, told SciDev.Net in an interview that the project, which is part of the UK aid-funded Building Resilience and Adaptation to Climate Extremes and Disasters programme, aims to help over 178,000 people in the region.

"The automated weather stations are providing herders with reliable climate information, so that they can weigh up risks and

make preventative decisions, like when to destock cattle or scale up water conservation activities," said Akilu.

Increasing climate variability has brought many herders in Ethiopia's lowlands to the edge of survival. As temperatures continue to rise due to climate change, these problems could potentially worsen, Akilu said.

A total of 25 solar-powered AWSs have been installed since 2015 when the project started, according to Farm Africa. It also involves the private sector to offer micro-insurance that covers climate risks.

The NGO expects the institutions implementing it to continue offering these services even beyond the 2018 expiry date of the project, said Jonathan Garrard, its head of programme support and design.

Zimbabwe secures US\$98mn for irrigation equipment

GOVERNMENT HAS SECURED a US\$98mn loan for irrigation equipment and machinery under the More Food for Africa Brazil programme, which will benefit 28 irrigation projects in Manicaland province. Nyanyadzi and Nenhowe irrigation schemes in Chimanimani district are set to be the first beneficiaries of the loan facility.

Speaking at the commissioning of Nyanyadzi Irrigation Scheme last week, Minister of Lands, Agriculture and Rural Resettlement Air Chief Marshal Perrance Shiri (Retired) said the move was targeted at increasing the area under functional irrigation and focus would be on rehabilitation, construction and modernisation of existing irrigation schemes.

Namibian farmers stop ploughing due to lack of rains

CROP FARMERS IN the Zambezi Region have provisionally suspended the ploughing and planting of their crop fields due to a sustained dry spell characterised by a lack of rainfall and low ground moisture.

The farmers stated that they are tired of the wait-and-see game as since the start of the year it has not rained – as a result the land is dry and they are left hopeless and in desperation.

A virtually dry November and rainless first half of December did not help the situation. Although there was a glimmer of hope when it started raining in mid-December, which encouraged farmers to start tilling their land, this was however short-lived.

Most of the farmers in region are subsistence farmers and rely on rain-fed agriculture, which depends on seasonal rains.

Bühler builds the world's first ultra-low-emission coffee processing plant

BÜHLER IS BUILDING the world's most advanced coffee processing plant for the Norwegian coffee producer Joh Johannson. It combines innovative roasting technology with record low greenhouse gas emissions. The coffee roasting biogas is close to carbon neutral, making the processing plant with the lowest emissions globally possible. "With Bühler, we have found a solution partner that fully understands our sustainability concerns and is capable of putting them to practice," said Espen Gjerde, CEO of Joh Johannson.

Bühler was awarded the contract for building the world's most efficient climate- and environmental-friendly coffee processing plant in June 2017.

Coffee continues to be a growth market with growth rates of about three per cent worldwide. After the considerable efforts of processors to achieve sustainable sourcing of green coffee, the focus is now being increasingly set on the manufacturing process in the coffee factory. This is because this process consumes a lot of energy: a factory with an annual processing capacity of 10,000 tonnes consumes roughly 870 kW – about as much as 100 Norwegian households.

For this low-carbon production plant, Bühler will supply the complete process technology – from green coffee intake to cleaning, blending, roasting, and grinding.

For the roasting process, Bühler has fitted its Infinity Roaster with a unique preheating unit and a novel energy recovery system. The system operates on the basis of collecting heat by multiple heat exchangers allowing centralised intermediate storage of the energy released by the process in temperature-stratified water tanks. The energy stored is largely used for powering the same roasting process and preheating of green coffee, but may also be reused – say – for raising the temperature of the incoming cold air. Some of the energy will also be used to heat the offices and laboratories.

Training to manage green scale insect pest in Libya

THE UNITED NATIONS Food and Agriculture Organisation (FAO) and IOM, the UN Migration Agency, with the financial support of the European Union (EU) is holding a five day "Training of Trainers" exercise for better management and control of the current date palm green pit-scale insect (*palmaspis phoenicis*) outbreak. This emergency project will be attended by 29 participants from Libya. It aims at helping to preserve the wealth of the Libyan oases, which represent a social and economic asset, with more than six million date palm trees spread over a wide geographical area between Kufra, Jallu, Jagala, Jafra and Fizan.

In his opening remarks, FAO coordinator for North Africa Michael Hage said that FAO supports member countries in



Image Credit: Bühler

Bühler's infinity roast technology for the coffee industry.

This technology reduces the energy consumption of the roasting process by 50 per cent, which accounts for as much as 80 per cent of the entire energy consumption. The total balance of electric power required by the factory is covered by huge solar cells. Moreover, the planned facility will boast one of the most advanced off-gas purification units for roasting systems: regenerative thermal oxidation (RTO) allows smart control of the air currents, which in turn enables heat to be stored and returned to the process.

"improving livelihood resilience against threats or crises," such as emergencies in the food chain, including transboundary pests, plant and animal diseases, and seafood sicknesses. Hage reiterated the importance of date production in Libya as an essential source of income and food, with a production of around 170,000 tonnes per year. Indeed, this project is part of the support to the Libyan Government to fight against the invasion of the green scale of date palms in the entire region of Sebha.

The implementation of this emergency project will be done in collaboration with the National Centre for Agricultural Protection and Quarantine (NCPQ) of the Ministry of Agriculture, Livestock and Marine Resources, the national partner for this project in Sebha.

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With a range of new features, the fifth edition of Agritech Expo Zambia promises to be bigger than ever before.

Chisamba prepares for the fifth Agritech Expo Zambia

"**A**GRITECH EXPO ZAMBIA has been embraced by the farming community and every year we look forward to bringing new features, new technologies, more country pavilions and more free training and knowledge sharing to add value to each and every farmer's operation" said Emmanuelle Nicholls, event director of Agritech Expo Zambia which will return to Chisamba from 12-14 April, for its fifth edition.

This year the event at GART is expected to bring more than 22,000 visitors, over 270 local and international exhibitors with 3,500 VIP and large scale farmers and 150 members of the media. Agritech Expo Zambia is free to attend for all visitors that pre-register.

Nicholls added, "Thanks to the support of the farming community in Zambia, but also in the region, Agritech Expo Zambia has been established as a marketplace for regional and international industry professionals, young agripreneurs and farmers of all scales, to come together in one location to conduct exclusive agribusiness transactions while being educated on the latest global industry trends to advance into the next generation of food production."

The international interest in the three-day expo is also growing with more and more foreign companies looking to invest and find business partners in Zambia. So far the country pavilions from France, Germany, Zimbabwe, Czech Republic and Finland have been confirmed.

Agritech Expo Zambia is a great source of pride for the Zambia National Farmers Union, the owners of the event.

The ZNFU president Jervis Zimba said, "It is our belief that Agritech Expo, which has become the biggest agricultural showpiece in Zambia, will continue unveiling new ideologies and technologies relevant to the growth of our farmers not only in Zambia, but also beyond, that will help lift the poor majority out of poverty; the push behind the creation of the expo. With this in mind, we are expecting an even bigger Agritech Expo in 2018."

Last year the event featured seven international pavilions and a VIP attendance that included five cabinet ministers and the Zambian President Edgar Lungu who visited the event for the third year in a row.

What to expect this year at Agritech Expo

- Machinery demonstrations - a great display of versatility and capability by leading machinery suppliers.
- Construction park - offers visitors a selection of quality construction equipment to suit their agricultural needs.
- 4x4 test track - gives visitors the opportunity to test their skills or simply be driven around the track and experience the capability and manoeuvrability of high-end utility vehicles.
- Crop trials – visitors are able to view the yields of seeds from a variety of seed producers and respective agro chemicals companies.
- Energy park - introduced in 2016 and offers innovative ways to get off the grid amidst the power crisis unfolding in the region.
- International pavilions - Agritech has become an internationally



Image Credit: Agritech Expo Zambia

The show will feature live demonstrations and an extensive knowledge programme.

acclaimed event, boasting over 39 countries being represented onsite year on year. In 2018, Agritech Expo expects to feature over 10 international country pavilions featuring products and solutions from global industry leaders.

Apart from these, the show will feature an indoor expo showcasing a variety of local and international agri suppliers looking to expand their footprint in sub-Saharan Africa; an irrigation zone displaying a variety of irrigation systems and farming solutions; a livestock zone incorporating various breeders who display their livestock services and a centre pivot display.


Knowledge programme

AgriTeach workshops, which are interactive training workshops, presented by industry experts and focused on modernising small-scale farmers are part of the show's knowledge programme. AgriTeach provides access to market information, practical demonstrations and innovations from the latest financial loan models to new agri solutions. Apart from this, the expo will also host large scale farmers seminars focusing on innovative solutions and initiatives to increase productivity under challenging market conditions.

New features for 2018

New features for the 2018 edition of Agritech Expo include mowing and baling demonstrations which will focus on quality mechanisation for mowing purposes and will give farming professionals the opportunity to view this equipment in action.

An aquaculture showcase with the regions' most prominent players in this field is another new feature this year.

Live planting demos will provide an opportunity for companies to practically demonstrate how products work. This year the expo will have a greenhouse showcase, a first-hand opportunity to see the effects and benefits of using a variety of seeds with fertilisers and pesticides to maximise yields. A value added zone aimed at boosting commercial opportunities for farming operations by featuring the latest industry trends and solutions on ways to improve quality and enhance yields will also be featured. 

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E coli vaccine helps reduce antibiotic usage in broilers

NEW RESEARCH HAS revealed that vaccination against *Escherichia coli* significantly reduced antibiotic use on commercial broiler farms, particularly in birds at high risk of infection.

Avian pathogenic *E coli* is one of the most economically significant diseases affecting the global broiler industry. It causes colibacillosis, characterised by a variety of conditions such as airsacculitis and cellulitis, which lead to condemnations. There are also substantial losses in productivity and, sometimes, high mortality in affected broilers.

Pathogenic *E coli* causes infection through exposure to contaminated faeces, water and dust, so colibacillosis control in broilers typically relies on biosecurity and sanitation, with antibiotic treatment as needed. However new studies have shown that *E coli* vaccination can prevent infections that require antibiotic treatment. This is a breakthrough given the current pressure on the industry to reduce antibiotic usage.

The studies were conducted by Zoetis in collaboration with independent veterinary practices in France and Germany and were presented at the 2017 World Veterinary Poultry Association meeting in Edinburgh.

The study, conducted in France, assessed the impact of a commercially available,



E coli can lead to substantial loss in productivity in poultry farms.

modified-live *E coli* vaccine on antibiotic use in broilers. It evaluated a total of three million birds on 17 commercial broiler farms that had experienced regular outbreaks of *E coli* infection.

The researchers found that *E coli* vaccination resulted in a 44 per cent reduction in the total number of antibiotic treatments ($p = 0.0004$), and a 40 per cent reduction in antibiotic treatments specifically for colibacillosis ($p = 0.03$).

Meanwhile, a separate study conducted in Germany has also revealed a link between *E coli* vaccination and antibiotic reduction. *Poultry Health Today* reports that this was conducted on 3.3mn broilers on three different farms in different regions of the country. The study evaluated the effect of the same live *E coli* vaccine on antibiotic-treatment frequency and found that *E coli* vaccination considerably reduced antibiotic-treatment frequency.

Image Credit: Orestl/getka/AdobeStock

Tanzania to become a major poultry producer

THE TANZANIAN POULTRY industry is gearing up for a multi-billion-shilling poultry project set to take off in Siha district, Kilimanjaro region. Irvines Tanzania Limited intends to produce 250,000 broiler chicks per week when production commences. US-based Tyson Foods is a partner in the US\$14.4 venture, the fourth largest investment in broiler breeding in Africa by the American food giant.

"We will breed the best quality chicks for the day using the latest

technology," said Irvines Tanzania managing director Pietro Stella. The first phase's production target is 250,000 chicks per week, while the second phase of implementation will see production double to 500,000 chicks a week. In full production, the facility aims to satisfy domestic demand for chicken as well as for the export market.

The 500 ha breeding facility will draw heavily from the experience of Tyson Foods, a well-established global player in the processing and marketing of meat and meat products. The company is the world's leading processor and marketer of chicken and beef, among other foodstuffs, for the export market.

Installation of structures for the breeding units at the company's Kiliwest farm are in the final stages. The company has revealed that it would go for Cobb 500 broiler breed chicks from the United States which are resistant to drought and disease. When fully implemented, Tanzania will become the fourth country in Africa to mass produce Cobb 500 breed of chicken after Zimbabwe, Botswana and Mozambique.

The Siha breeding centre for chicks, which will employ about 100 workers, will be complemented by a hatchery to be established at Kerege, near Bagamoyo, in July this year. The company commented that the hatchery has been established in Bagamoyo because of its proximity to Dar es Salaam, the largest market for poultry products in the country.

Mr Hussein Gongga, one of the partners in the project, said the scheme had high potential and was in line with the government's industrialisation drive. He lauded the government for creating a conducive environment which had attracted investors to the agricultural sector, which, he added, would accelerate industrialisation.



Image Credit: colos/AdobeStock

The project will be the new fourth largest investment in broiler breeding in Africa.



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Animal health and welfare are the two cornerstones of sustainable livestock production, delegates at the tenth Global Forum for Food and Agriculture (GFFA) held in Berlin in January 2018 have concluded.

Towards sustainable, responsible and effective food production

IMPROVED ANIMAL HEALTH and welfare standards do more than just improve animal health and welfare. They also play a critical role in increasing food production in ways that protect the environment and enhance the resilience of livestock producers and systems.

According to the International Livestock Institute (ILRI), any transition to more responsible and efficient livestock production models depends on the implementation of appropriate health and welfare standards. Equipping national officials and private businesses with the technical knowledge and resources to adapt global standards to local circumstances, is therefore crucial.

This point was repeatedly raised by the keynote speakers at a high-level panel on the future of animal health and welfare organised by the World Organisation for Animal Health (OIE) as part of the tenth Global Forum for Food and Agriculture (GFFA), which was held in Berlin from 18 to 20 Jan 2018.

With rising populations and growing urbanisation, the livestock sector is critical to producing nutritious foods.

The GFFA is an international annual conference on the future of the global agri-food industry organised and hosted by Germany's Federal Ministry of Food and Agriculture (BMEL) in cooperation with GFFA Berlin, the Senate of Berlin and Messe Berlin GmbH. The annual forum gives representatives from the worlds of politics, business, science and civil society opportunities to share ideas and enhance understanding of topics shaping current agricultural policy. This year's forum addressed issues on "Shaping the Future of Livestock - Sustainably, Responsibly, Efficiently."

More than 2,000 representatives from politics and business, science and civil society discussed ten expert panels, two ministerial meetings and a business panel at the forum on how animal husbandry can



ILRI delegation at the Global Forum for Food and Agriculture in Berlin.

Image Credit: ILRI/Dieter Schilling

be more productive, yet more environmentally friendly and more animal-friendly.

The significance of animal health and welfare

"Animal health and welfare: Two cornerstones for the future of globally diversified livestock production," was one of the panel events at the forum. Monique Eloit, director general of the OIE, highlighted the centrality of livestock production to the livelihoods of 750 million of world's poorest people at the panel. Every year, up to 20 per cent of the world's livestock production is lost to animal diseases, she said. She stressed the need for resilient animal health systems that are able to prevent and control animal diseases.

"Our societies are calling for a world where the welfare of animals is respected, promoted and advanced in ways that meet the requirements of sustainability, climate stewardship and economic efficiency. With rising populations and growing urbanisation, the livestock sector is critical to producing nutritious foods," said Eloit.

Managing diseases

Many speakers at the event underlined the growing importance of disease management, given how interdependent the world is becoming. The nature of infectious diseases requires cooperation across borders, they said. But compliance with disease control regulations is a challenge

for many governments and businesses. In 2017, for example, 300 new trade measures related to animal health were introduced worldwide.

"Trade in animals is worth US\$156bn a year," said Christiane Wolff, counsellor in the Agriculture and Commodities Division of the World Trade Organisation. "But diseases can be transmitted through trade, and measures to ensure trade is safe also restrict that trade. Compliance challenges take the form of such requirements as setting up certification schemes and learning new knowledge." Wolff argued that disease control regulations should be based on scientific evidence and harmonised as much as possible to keep compliance-related costs to a minimum. And developing countries will need to increase their capacities in managing livestock disease, she warned, if they want to continue engaging the rules-based systems of industrialised countries.

"Increased cooperation and support is essential to human and animal health and well-being in the Sahel region," explained Maty Ba Diao, coordinator of the Regional Support Project for Pastoralism in the Sahel (Projet Régional d'Appui au Pastoralisme au Sahel) (PRAPS) at the Permanent Interstate Committee for Drought Control in the Sahel, which is based in Burkina Faso. PRAPS receives funding from the World Bank to strengthen the provision of



Infectious diseases pose a major threat to the livestock industry.

veterinary services in four countries in the Sahel region: Burkina Faso, Chad, Mali and Senegal. The project places a special emphasis on provision of local animal health services, particularly training people to deliver services locally and farmers to better control diseases.


“Animal health and welfare are important for farmers to be able to produce more, higher quality food. When we speak of small ruminant diseases, we are speaking of diseases that affect people. Reducing the impact of these animal diseases frees up people to produce more, to generate greater incomes and to feed their families better,” said Maty Ba Diao, PRAPS.

Making livestock production and animal husbandry more sustainable, responsible and efficient will play a crucial role in advancing the right to adequate food and implementing the 2030 Agenda

Ministers’ call for action

Agricultural ministers and representatives of international organisations participating in the GFFA stressed the need for action towards more sustainable, responsible and efficient livestock production and animal husbandry to address global challenges, including SDG 2 (zero hunger); SDG 3 (good health and well-being); and SDG 13 (climate action).

In their final communique, the 69 agricultural ministers attending the Forum recognised that making livestock production and animal husbandry more sustainable, responsible and efficient will play a crucial role in advancing the right to adequate food and implementing the 2030 Agenda. The Communique includes a ‘Call for Action,’ outlining targets, commitments and actions towards strengthening the role of livestock in: ensuring food security and nutrition; improving livelihoods; conserving natural resources, protecting the environment and addressing climate change; and improving animal health and animal welfare.


On food security and nutrition, the ministers aim to, among other actions, develop policies for more efficient, and sustainable livestock production systems; improve access to food of animal origin for low-income households; and expand research and knowledge creation and transfer to develop alternative sources of protein to feed people and animals. On improving livelihoods, the Communique stresses: the need for responsible investment in the livestock sector; strengthening the position of farmers and workers along value chains; and equal access to education and training as well as land and natural resources. 

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Dr Terry Mabbett writes about the role of sulphur as an essential nutrient for proper plant growth and development in tea crops.

Image Credit: Dunc/AdobeStock

Sulphur to brighten the brew

Sulphur helps to maintain low soil pH on which the acid-loving tea bush thrives.

TEA (*CAMELLIA SINENSIS*) requires the full range of essential plant nutrients but this evergreen bush has a special need for sulphur over and above its function as an essential nutrient for proper plant growth and development. This requirement is related to the importance of sulphur as a soil amendment chemical to generate and maintain the low soil pH on which the acid-loving tea bush thrives. However, the most important commercial function for sulphur lies in its close association with specific tea chemicals that give the tea liquor its sought after taste, color, brightness strength and body. It seems strange that the quality of a fine aroma beverage like tea should depend heavily on an unpleasant smelling chemical but there is a lot more to sulphur than meets the eye.

In order to produce one tonne of finished tea the factory requires five tonnes of freshly picked leaves which will have extracted no less than 10 kg of sulphur from the soil.

Sulphur is one of the world's 'oldest' known chemical elements and referred to in antiquity as 'biblical brimstone.' It is widely abundant in the earth's crust and closely associated with volcanic activity and hot water springs. As a yellow solid that burns with a pungent smell, sulphur has long been associated with all things evil. But there is an aesthetic and health-giving side to sulphur that comes through strongly in the cupped infusion of tea.

Sulphur has long been used in ointments to cure skin diseases and featured strongly in some of the very first drugs (sulfa drugs) used as antibiotics. Indeed, tea was first consumed as a medicine in the Yangtze Kiang Valley of China around 2700 BC. And today, after water, tea is the most heavily consumed drink in the world because of its health giving, dietetic and even therapeutic properties.

Sulphur was the 'forgotten' element. For many years farmers and growers have indulged on 'free' sulfur as non-costed 'rider' impurities in NPK fertilisers. And as byproducts of industry, spewed out and spread over the land by coal-fired power stations and factory chimneys. But forward-thinking governments using modern technology are beginning to clean up and

'green-up' the environment. And with it will come the progressive 'de-greening' of crops due to a shortfall in sulphur and with plant deficiency starting to show as leaf yellowing or chlorosis.

Early signs of deficiency in crops can be confusing because the leaf yellowing indicative of sulphur deficiency is not unlike the symptoms for nitrogen deficiency. However, nitrogen deficiency shows up first in older leaves, while sulphur deficits affect the youngest leaves first.

Sulphur requirements for tea

The sulphur requirement for tea is very high at 16 to 26 kg/ha/year, but this is hardly a surprise since tea grows 'naturally' on soils of volcanic origin created by the very same geological processes that create elemental sulphur in large amounts. The sulphur content of tea foliage should be maintained at 0.08 to 0.20 per cent on a dry matter basis to achieve maximum yields of fresh green leaves for processing into high quality tea products.

In order to produce one tonne of finished tea the factory requires five tonnes of freshly picked leaves which will have extracted no less than 10 kg of sulphur from the soil. And tea production by its very nature, with

regular plucking of the youngest and most nutrient-rich leaves, will exhaust soil nutrients including sulphur.

When averaged out over the entire foliar canopy of the tea bush, the sulphur content is way down the list of nutrients (Table 1). However, when nutrient analysis targets the third youngest unfurled leaf sulphur shoots up to rank equal third with phosphorus (Table 2). And this is clearly important given that new shoots bearing terminal buds (golden tips) and the youngest leaves are picked for processing into the finest grade teas. Plucking the terminal bud plus three leaves achieves the highest yield of quality shoots and some 25 per cent more by weight than the bud plus two leaves. Finished tea products based on shoots which include this third leaf are considered to be premium teas having high concentrations of two important tea chemicals, polyphenols (tannins) and theine (tea caffeine).

'Sulphur yellows' is an ongoing problem in countries such as Kenya, Uganda, Malawi and Zambia.

Table 1. Nutrient levels averaged out for leaves at all stages of development on the tea bush

Nitrogen	4.00 to 5.00 %
Potassium	1.50 to 2.00 %
Phosphorus	0.40 to 0.90 %
Calcium	0.30 to 0.90 %
Magnesium	0.30 to 0.05 %
Sulphur	0.08 to 0.20 %

Table 2. Nutrient levels for the third youngest leaf on tea shoots

Nitrogen	5.00 %
Potassium	3.00 %
Sulphur	0.50 %
Phosphorous	0.50 %
Calcium	0.35 %
Magnesium	0.30 %

Up to 40 per cent of the sulphur absorbed by tea roots will be re-cycled into the soil as fallen mature leaves and pruning waste, but there is still a considerable shortfall. A tea harvest weighing in at 3000 kg will have removed some 6 to 9 kg of sulfur/hectare/year from the soil, say researchers at the internationally famous Tocklai Experimental Station based in Jorhat, India, which is home to the world famous Assam teas. Field trials show that soils in North Eastern India become

seriously depleted of sulphur, through continuous picking, unless suitable fertiliser application programmes are in place.

Sulphur deficiency in tea

Sulphur shortfalls on tea estates are nothing new. Indeed sulphur deficiency symptoms in tea bushes called 'sulphur yellows' or 'yellow disease', have long been recognised in East and Central Africa. Sulphur is central to plant nutrition, being required for synthesis of sulphur-containing essential amino acids like cysteine and methionine and the manufacture of chlorophyll pigments. When sulphur is in short supply chloroplasts break down and with it the normal dark green color of tea foliage.

Young leaves are hardest hit by a shortfall in sulphur with an unhealthy looking pale yellow colour and yellowing of the inter-vein areas. New shoots are smaller and internodes (distance between leaves) shorter due to a slowdown in growth to be followed by general shoot necrosis if the sulphur deficiency persists.

Consequences for yield and tea quality are severe and especially since the new shoots comprising bud and two to three leaves are required for the finest grade tea.



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To make matters worse leaf yellowing symptoms are exacerbated by lower temperatures, the very conditions experienced at night on the hillsides where tea is typically grown. Sulphur is known to enhance the frost resistance of tea bushes.

'Sulphur yellows' is an ongoing problem in countries such as Kenya, Uganda, Malawi and Zambia. And to such a degree that sulphur fertilisers are required. Originally there was no such thing as a dedicated sulfur fertiliser. Instead, tea estates applied sulphur through nitrogen and potassium fertilisers such as ammonium sulphate and potassium sulphate, which contain sulphur in the molecule.

With a universal need for sulphur for crops in general the fertiliser industry responded with dedicated sulphur fertilisers as products containing yellow elemental sulfur in pastille or prill form and now widely used and especially on tea. The sulphur is degraded in the soil by Thiobacillus bacteria to form soluble sulphate that is absorbed by the root system of the tea bush.

Sulphur fertilisers are also used in a soil amendment capacity to increase soil acidity in tea estate rehabilitation. Trials carried out by the Tea Research Foundation of Kenya on the Kapchorua Tea Estate using a water degradable sulphur pastille showed real benefits. The dedicated sulphur fertiliser reduced soil pH from 6.3 to 5.5. The tea bush 'demands' an acid soil with a pH between 4.5 and 5.5 and performs poorly in soils that are too compact or alkaline.

Colour, brightness, strength, body, taste and flavor of the tea liquor are adversely affected by sulphur-deficiency.

Sulfur and tea quality

Everyone knows that correctly dosed and balanced fertiliser improves crop yield and quality. For many crops such benefits are difficult to 'pin-point' and 'pin-down' but tea is different.

Tea processing involves fresh green leaves being put through a series of exhaustive processes including withering, rolling, fermentation and firing. This generates and consolidates a group of all-important chemicals that combine to determine tea quality through flavour and aroma, body, strength, colour and brightness of the liquor. Tea processing ends with the infusion to leach out the chemicals into hot water for assessment by expert tasters. Results from



Tea processing involves fresh green leaves being put through a series of exhaustive processes including withering, rolling, fermentation and firing.

Image Credit: precetti/AdobeStock

this 'ultimate test' can be used to 'pin-point' the effect of growing conditions including soil nutrient status.

And this is exactly what was done at Tocklai Experimental Station where tea agronomists, food scientists and tasters identified the significance and exact role of sulphur in tea quality. Field trials over a six-year period using a variety of sulphur sources, including gypsum (calcium sulphate), ammonium sulphate and micronized elemental sulphur, gave positive responses but only up to a certain level. Tea yields increased with application of sulphur up to 40 kg/ha/year, with 20 kg/ha/year being the most cost-effective treatment.

Colour, brightness, strength, body, taste and flavor of the tea liquor are adversely affected by sulphur-deficiency, but the Tocklai trials went further and related changes in these parameters to levels of specific chemicals in leaves. The tea was produced by CTC (crushing, tearing and curling). Key tea chemicals were measured using biochemical analysis and high performance liquid chromatography (HPLC) of black tea liquors.

Tasters from J Thomas & Co Limited in Calcutta were used to assess organoleptic quality. Tasters' scores at 74.0 for tea produced with 20 kg sulphur/ha were by far the highest, 13.7 higher than no sulphur and 10.0 higher than 40 kg sulphur/ha. Objective quality factors showed the same trend for both brightness and total color responding positively to sulphur fertiliser.

Two groups of chemicals called theaflavins and thearubigins which are responsible for body, strength, taste, odor and the bright amber/red colour of quality liquor proved to be crucial in the quality equation. They were found in higher concen-

trations following sulphur application with 20 kg sulphur/ha giving the best overall result. In addition, marginal increases in flavonol glycosides such as rutin and quercetin are thought to have contributed to brighter color and enhanced flavor.

Contribution of sulphur to the bright, amber-red colour of quality black tea liquor is intriguing. Sulphur in its common solid state is a yellow powder. On heating it melts to give a bright amber liquid which crystallises on cooling to produce amber crystals with a colour and 'shine' uncannily similar to that of quality black tea liquor.

These observations and findings related to theaflavins and thearubigins, and their connection with sulphur, can be related to concentrations of polyphenols in the fresh green leaves. Theaflavins and thearubigins are produced by enzyme controlled oxidative reactions on polyphenols during fermentation. Polyphenols are heavily concentrated in the youngest foliar growth of tea - terminal bud (28 per cent), smallest (first) leaf (28 per cent), second leaf (21 per cent) and third leaf (18 per cent).

Summary

In summary, shortfalls of sulphur have the biggest negative effect on the growth, quality and health of the youngest foliar growth (terminal buds and first three unfurled leaves) which are those selectively plucked for the finest grade teas. This young shoot growth has the highest concentration of polyphenols which are converted during fermentation by polyphenol oxidase enzymes into the all-important tea chemicals (theaflavins and thearubigins) which essentially govern and determine quality of the tea liquor. **E**

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Insurance is one of the most effective ways to increase the resilience of smallholder farmers against the challenges of climate change.

Protecting against climate change with insurance

STUDIES HAVE SHOWED that smallholder farmers are among the most vulnerable to the effects of climate change, including droughts, floods and wildfires. This is especially true for poor farmers in drought-prone regions of the world who rely on crops or livestock to feed their families.

A new study by the University of California, Davis, has revealed that insurance can be the most effective way to increase the resilience of poor households in the face of climate change while also preventing other households from falling into poverty. In the long-term, it also reduces the number of households that need emergency aid and stretches the aid budget further. The study, published in the journal *Environment and Development Economics*, shows that insurance becomes even more effective as the risk of drought increases.

Insurance can be the most effective way to increase the resilience of poor households in the face of climate change while also preventing other households from falling into poverty.

Eastern Africa as model

A major driver of poverty among agricultural households is some kind of catastrophic shock, such as a drought. The study shows that this is especially true in eastern Africa, which is still in its worst drought in a generation.

"This is an area of the world where a severe drought event can destroy 50 to 60 per cent of a family's wealth. Families can lose absolutely everything in the space of a couple of months," said Michael Carter, a professor of agricultural and resource economics at UC Davis and director of the Feed the Future Innovation Lab for Assets and Market Access in an interview with *Phys.org*.

Carter and his co-author Sarah Janzen, an assistant professor of economics at



In parts of east Africa, a severe drought event can destroy 50 to 60 per cent of a family's wealth.

Image Credit: cronopio/AdobeStock

Montana State University, developed an economic model to determine what types of interventions would work best to break the cycle of poverty related to drought and climate change. The model shows that partially subsidised insurance can be much more effective than conventional aid programmes that target families only after they have fallen into misery.

The small premiums farmers pay for coverage at the start of each season almost guarantee that they will receive funds in an emergency. Not only is this more predictable than emergency aid, it also has the potential to be self-sustaining through the payment of premiums.

"This analysis suggests that targeting vulnerable households—in addition to the already destitute—will protect households against heightened risk and minimise unnecessary poverty in future generations," said Janzen.

World's largest non-governmental climate insurance programme

VisionFund International, World Vision's microfinance arm and Global Parametrics, has recently launched a new climate insurance programme, the African and Asian Resilience in Disaster Insurance Scheme

(ARDIS), that will benefit more than four million people in six low-income countries.

The programme is thought to be the world's largest non-governmental climate insurance programme. ARDIS will increase access to finance and provide post disaster recovery lending to rural families and smallholder farmers who live below the poverty line and participate in VisionFund's microfinance network.

The programme is funded by the United Kingdom's Department for International Development (DFID) and by the InsuResilience Investment Fund, set up by German development bank KfW and managed by Swiss-based impact investment manager BlueOrchard Finance. Financing for the initial preparation and assessment required to implement the programme came from the Rockefeller Foundation and FMO, the Dutch development bank.

In its first year, ARDIS protection will be provided to VisionFund's clients in Kenya, Malawi, Mali, Zambia, Cambodia and Myanmar, of which around 80 per cent are women. This programme will effectively meet one per cent of the G7 goal to increase access for up to 400mn uninsured people in developing countries to insurance products that protect against climate risk.

The ARDIS programme allows beneficiaries to receive swift access to much-needed credit required by farmers and small businesses after a climate shock. Recovery lending, essentially small loans with special terms, is provided through VisionFund's microfinance institutions. Such loans are disbursed immediately during and after disasters to help clients maintain or restart economic activities, complementing relief aid which is required for urgent survival needs in disaster situations.



Michael Topic Turere, pictured on his farm, took out a VisionFund Kenya recovery loan to help him get back on his feet.

Image Credit: VisionFund

despite the common disruptions created by such calamities. For example, typically in disasters when clients cannot repay loans and there is higher demand for lending, microfinance institutions suffer a reduction in the amount of capital they hold and are therefore required to curtail their lending.

The contingent liquidity for ARDIS is provided by the InsuResilience Investment Fund which is managed by impact investment specialist, BlueOrchard Finance, and backed by KfW on behalf of

Fast recovery lending to the client is enabled by the provision of liquidity

VisionFund International recently launched a new climate insurance programme, the ARDIS, that will benefit more than four million people in six low-income countries.

to the microfinance institution in order to bolster its resources to cope with increased demand. Global Parametrics' advanced climate-based data modelling verifies the climate event and triggers access to both contingent liquidity and risk capital by VisionFund's microfinance institutions. This injection of funds to the microfinance institutions restores their balance sheets, thus ensuring business continuity or enhancement of operations and services

BMZ, the German Federal Ministry for Economic Cooperation and Development. Risk capital is provided through the Natural Disaster Fund that is managed by Global Parametrics and currently funded by the British government via DfID. The structure offers an affordable and sustainable system for disaster recovery lending at costs of approximately half a per cent of loan portfolio value per annum payable by the microfinance institution. **B**





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A recent study by AfricaRice reveals that conservation agriculture has a vital role to play in sub-Saharan Africa's food security for a population, projected to rise to two billion by 2050.

Improving rice yields with conservation farming

FARMERS IN RAINFED drought-prone areas are increasingly vulnerable to agricultural risks from a changing climate. According to environmental experts, climate change threatens to turn vast areas of productive land in Africa into dust bowls, leading to widespread hunger and migration of rural populations.

Many experts believe that the solution lies in a move away from intensive tillage-based agriculture, which was found to accelerate soil erosion in dryland systems, to an approach called "conservation agriculture."

Conservation agriculture is a set of soil management practices that are based on three principles: (1) maintaining organic matter cover over the soil throughout the year using cover crops and intercrops and/or mulch provided by crop residues, (2) minimising soil disturbance by tillage and seeding directly into untilled soil, and (3) diversifying crop rotations and associations, including nitrogen-fixing legumes.

It is reported that about 65 per cent of the arable land in Africa is already degraded and several countries are facing critical food shortages.

A promise for Africa

Savitri Mohapatra writes in her article, "From dust bowl to rice bowl," on *Rice Today* that some of the principles of conservation agriculture are not new to Africa. Smallholder farmers traditionally grew cowpea or groundnut, in rotation with cereals or as intercrops, and then left their land fallow for several years to restore soil fertility. But, with high population pressure, the fallow periods have become shorter and the cropping periods longer. As a result, soil fertility and crop yields have declined drastically. In some areas, the soil has become so dry and hard that even the rains bring little relief for farmers as the water runs off, taking the precious topsoil with it. It is



Conservation agriculture can help farmers maintain yields even in harsh conditions.

reported that about 65 per cent of the arable land in Africa is already degraded and several countries are facing critical food shortages.

Sustainable farming practices such as conservation agriculture have a vital role to play in sub-Saharan Africa. With increasingly scarce resources, it is critical for the region to abandon farming practices that mine the soil and adopt those based on resource-use efficiency and conservation of natural resources.

Keeping this in mind, the Food and Agriculture Organisation of the United Nations, the New Partnership for Africa's Development, the Alliance for a Green Revolution in Africa, the African Conservation Tillage Network, French Agricultural Research for Development (CIRAD), and CGIAR Research Centres and Programmes, among others, are investigating the potential of conservation agriculture approach in Africa.

Advantages for upland rice

CIRAD has developed several cropping systems for uplands, based on conservation

agriculture, such as improved fallow systems using *Stylosanthes guianensis*, a forage legume, as a cover crop. The legume helps restore soil fertility through high biomass production and nitrogen fixation.

These systems could be sustainable and profitable in places where soils are vulnerable. The improved fallow systems could also be attractive to upland farmers in Madagascar, particularly when they have cattle to feed.

Research by AfricaRice, CIRAD, and the Centre National de la Recherche Appliquée au Développement Rural (FOFIFA), the national research institute of Madagascar, has confirmed that growing a legume cover crop following a zero-tillage approach is an efficient strategy to control the destructive parasitic weed *Striga asiatica* in upland rice. This strategy is being widely promoted through a demo video, available in local languages.

Healthy soil, healthy rice

AfricaRice and CIRAD are developing cropping systems based on conservation

agriculture principles for the agronomic management of biotic stresses in rice such as pest, diseases, and weeds. "Our aim is to co-design with local farmers cropping systems that can provide plant protection with minimum inputs," said Olivier Husson, CIRAD/AfricaRice systems agronomist.

As part of this research, Dr Husson and his team are developing standardised methods for measuring three parameters, which can be used to efficiently characterise soil/plant conditions and indicate the robustness of cropping systems against biotic stresses.

"In this research, we are testing a new concept for managing pests and diseases," observed Dr Husson. "Instead of trying to control these stresses through adjustment of farming practices, we aim at increasing biodiversity through cropping systems to alter the environment and make it unfavorable for the biotic stresses."

If this succeeds, it will open a new approach for integrated pest management.

Experiments on conservation agriculture for rice-based cropping systems have been set up at the AfricaRice research station in M'bé. Different crop/cover crop associations and rotations and soil management practices

AfricaRice and CIRAD are developing cropping systems based on conservation agriculture principles for the agronomic management of biotic stresses in rice such as pest, diseases, and weeds.

are being tested so that farmers can pick what fits them best or could be adapted to meet their constraints and means.

The impact of these systems on pest development will be studied to improve their performances.

Building the capacity of national agricultural research and extension systems in Africa on conservation agriculture in integrated rice-based systems is a major component of this collaborative work. The experiments at M'bé serve as a training and demonstration platform site where researchers and farmers can interact and learn from each other.

Challenges and opportunities

As conservation agriculture is knowledge-intensive, it requires a deeper understanding of ecological processes. It also calls for new skills and a change in mindset. For smallholders, this is a big challenge as any change in their farming

practices implies risks.

The lack of a simple recipe for restoring soil health everywhere is another challenge for its large-scale adoption. However, it offers great opportunities for researchers to work with farmers to diagnose local soil and climatic conditions and redesign appropriate cropping practices.

"Despite very unreliable rainfall in the past three years in M'bé, we could produce a minimum of 800 to 1.2 tonnes/ha every year without mineral fertilisation application and tillage and with very limited weeding," said Dr Husson. "We are minimising the risk taken by farmers and providing a benefit every year and achieved yields of up to 4 tonnes/ha with fertilisation. This shows that, if we learn to use the strength of nature, instead of fighting it, we can restore soil fertility rather quickly."

This article by Savitri Mohapatra first appeared on IRRI publication, *Rice Today*. 

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New Holland and the Climate Corporation partner to deliver two-way data sharing

NEW HOLLAND AGRICULTURE and The Climate Corporation, a subsidiary of Monsanto Company, has announced a new partnership that will extend and develop a portfolio of data sharing capabilities to help farmers with real-time agronomic visualisation and decision-making solutions.

Thanks to this agreement, New Holland Agriculture will provide its customers two-way data connectivity between its PLM Precision Land Management system and The Climate Corporation's industry-leading Climate FieldView digital agriculture platform.

This partnership offers New Holland customers unique functionality due to the depth and breadth of real-time machine and field data, including agronomic prescriptions, which can be both received and transmitted to Climate FieldView using the New Holland brand's PLM precision land management platform. To date, this integration with Climate FieldView provides one of the most extensive data sets available. This additional level of real-time data connectivity will enable agribusinesses to fine-tune field operations to further enhance their in-field productivity and efficiency across their existing machinery fleets.



Image Credit: New Holland

New Holland is one of the leading manufacturers of agri-machinery in the world.

"New Holland's partnership with The Climate Corporation will provide our customers with a powerful tool to drive productivity, efficiency and profitability in their businesses," said Carlo Lambro, New Holland Agriculture brand president.

In addition to the in-field benefits, this partnership foresees further development to provide those New Holland dealers offering Climate FieldView additional tools to proactively support their customers. Both companies are working to enable farmers the ability to share real-time machine information

with their local New Holland dealer, in order for them to receive support even more quickly.

"Through this partnership, which focuses on opt-in two way data sharing through the Climate FieldView platform, New Holland is offering its customers one of the highest levels of integration and interaction in the market today. It is the most recent example of how we are investing in our precision land management solutions, a driving principal of our agricultural innovation program," said Dan Halliday, precision land management product manager.

Case IH Autonomous Concept Tractor receives Good Design Award

THE CHICAGO ATHENAEUM Museum of Architecture and Design and Metropolitan Arts Press Ltd has announced the Case IH Autonomous Concept Tractor as one of the winners of this year's prestigious Good Design Award. The Museum's annual GOOD DESIGN Awards recognise the most innovative and cutting-edge industrial, product, and graphic designs produced around the world.

Case IH first unveiled the world's first high horsepower, cabless autonomous concept tractor at the Farm Progress Show in 2016, marking a revolutionary step forward in tractor design. The tractor was designed by CNH Industrial's in-house Industrial Design Centre and based on the current Case IH Magnum row crop tractor. The concept's design was focused on both form and function, reimagining the tractor for a future autonomous era by eliminating the traditional operator cab.

"This award marks a satisfying conclusion to the celebration of our 175th anniversary," said Andreas Klauser, Case IH brand president.

"The autonomous concept tractor is perhaps the best illustration of how we are living up to the anniversary's tagline – celebrating the past by looking toward the future."

After the reveal at the Farm Progress Show in August of 2016, the tractor was shown at trade fairs in France, Brazil, Argentina and Australia. "Over the past year, we have used this concept tractor as a way to kick off a dialogue with our customers as to what the future of farming will look like in five or ten years' time," explained Klauser.

"From talking to customers in different countries, we see that for the near term, they want to have the flexibility of still having a cab on the tractor. This is the direction we are taking because we want our customers to feel comfortable as they begin to delegate more tasks to the machines themselves," Klauser added.

"We have already begun to see some of the applications of this concept study being applied in our current lineup – such as AccuTurn™ and there are more introductions on the horizon."

AccuTurn takes the guesswork out of turning on headlands with automated headland-turning technology powered by software logic from the autonomous concept tractor. This next-generation Advanced Farming Systems (AFS) autoguidance technology provides hands-free, automatic and repeatable turns for increased productivity, improved accuracy and reduced operator fatigue.

"We will see more AFS product content on our offering to come in 2018," said Klauser. "We are excited to be starting a pilot programme with an evolved concept that incorporates the feedback from customers' reactions to the concept as well as additional testing. We are working with a key customer with intensive tilling operations to thoroughly test the implementation of this technology."



Image Credit: Case IH

Case IH's autonomous concept tractor.

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Baldan has played a major role in fostering agricultural mechanisation in Africa. As the company celebrates its 90th anniversary, a look at its contributions in the region.

Fostering agricultural mechanisation

BALDAN AGRICULTURAL MACHINERY has become well known, and is highly regarded for its robust quality and reliable and efficient performance, by farmers across Africa, over the last 40 years.

Located in the small town of Matao in the State of Sao Paulo, some 350 km from the city of Sao Paulo, Baldan has been involved in the manufacture of agricultural machinery equipment and discs for 90 years, and stands out for its wide and diversified product line. Combining its long experience with the use of state of the art technology, Baldan has been developing products with advanced engineering concepts meant for soil preparation, cultivation and planting of a variety of large and small grain crops and for maize harvesting. It also has an exclusive line of heavy equipment for use in sugar cane cultivation.

Baldan has in its portfolio more than 120 different products, in around 2500 versions/sizes for use with small, medium and heavy tractors, aimed at meeting the needs of private and corporate farms from diverse regions across the planet. Baldan equipment is available in more than 75 countries, and its Fish or Samaki Trade mark is well known to farmers in nearly 20 African countries.

Since 1990 Baldan has aggressively promoted the marketing and distribution of its equipment in Kenya, Uganda, Tanzania, Ethiopia, Nigeria, Zambia and Malawi through Pan Trade Services Ltd, its UK based marketing arm.

A market leader in Kenya

"It is the longest and largest contributor to food production in East Africa, especially Kenya. It also has a strong presence in West, South and North Africa," said Fergus Robley, general manager of FMD East Africa, a major distributor of Baldan in East Africa.

Robley pointed out that FMD has been dealing with Baldan since 1976 and that the company has contributed significantly in shaping farming in the region.

"Baldan was one of the first, if not the first, implements to be sold into Kenya from Brazil. The good thing about the Brazilian equipment is that because of the geographical positioning, it is particularly well suited for Africa," he said.

According to Robley, Baldan equipment is strong and durable and because the equipment is still produced in a very traditional way, the quality of production is world class and they are still producing machines that are appropriate for Africa. "In Africa,



The Baldan factory in Matao, SP, Brazil spans 65,000 sq m of constructed area in an industrial park covering around 25 ha.

Image Credit: Baldan

most machines don't stay on in one farm, they get moved about and are open to a lot of abuse during the transport between one farm to the other. This is where Baldan equipment scores highly because it can cope with that abuse."

The equipment caters to the whole spectrum of farmers ranging from subsistence, semi-subsistence, semi-commercial to commercial farmers.

Robley stressed that both FMD and Baldan are committed to promoting the mechanisation of farming to improve food production in Africa. "Africa has to embrace technology to produce more food on the land available." Now more than ever, he explained, given the rising world population, it is important that every effort be put into increasing food production.

Contributing to agricultural development in Uganda

Ian Walker, managing director of ENGSOL in Uganda, another distributor of Baldan, also agrees that Baldan is contributing significantly to the development of agriculture in Uganda. "The transition from manual to mechanised agriculture is slowly happening in Uganda and Baldan is playing its role," he said.

According to Walker, what sets Baldan apart is the performance durability and reliability of its machines. "The equipment is very suitable for Ugandan conditions. The equipment is designed for very hard conditions which is what we face in the region."

Disc ploughs, disc harrows and planters are the most popular equipment in Uganda.

After sales service is another area Baldan excels in. "We get robust training support from the company. Baldan sends out people to Uganda and other African countries to conduct training on their equipment. They do this regularly and they also support us with product demonstration when we want to show or explain existing products to new customers," Walker added. **E**



Image Credit: Baldan

Baldan's CRSG- wheel type offset remote control disc harrow.



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IoT to strengthen health and safety in agriculture

AN INDEPENDENT STUDY commissioned by global mobile satellite company Inmarsat, which found that half of agritech companies will strengthen the sector's health and safety practices through IoT adoption. The farm of the future will leverage Internet of Things (IoT) technologies to create safer working environments and drive down risks to the workforce, the study has concluded.

Market research specialist Vanson Bourne interviewed 100 agritech companies from across the world as part of Inmarsat's The Future of IoT in Enterprise study. It found that 49 per cent of agritech companies rate improving health and safety as one of their primary motivations for developing IoT solutions, ahead of monitoring environmental changes (48 per cent), and identifying efficiency gains and cost saving opportunities (45 per cent). In a similar vein, 40 per cent expect IoT to bring significant improvements to health and safety practices in the near future.

Commenting on the findings, Chris Harry-Thomas, director of Agritech strategy at Inmarsat Enterprise said, "Despite industry efforts to improve health and safety in agriculture, research from the International Labour Organisation reveals that the rate of

fatal accidents has remained high, and that it continues to be the world's most dangerous industry. It estimates that 170,000 agricultural workers are killed each year, and that millions more suffer injuries from accidents with agricultural machinery or negative long-term health effects from exposure to agrochemicals and pesticides."

"With the Fourth Agricultural Revolution under way, IoT can present agritech businesses with a wealth of solutions to these challenges. Automated systems, enabled by IoT, can reduce risk by removing workers from the most dangerous procedures, such as lifting heavy materials or operating dangerous machinery. Automated machinery can also typically respond quicker to emergencies, monitoring and stopping equipment before there is a threat to worker safety. The industry is also leveraging the Internet of Things through the form of wearable technologies. These devices, integrated into watches, helmets and clothing, can detect falls and monitor staff health through heart rate and temperature, enabling agricultural businesses to react more quickly to emergencies and bring rapid response medical attention to injured staff."

John Deere 9RX series tractors recognised for design innovation

JOHN DEERE RECENTLY won a Good Design™ Award for 2017 by the Chicago Athenaeum Museum of Architecture and Design for its 9RX Series Tractors. Each year, the museum presents these awards to the most innovative and cutting-edge industrial, product and graphic designs from around the world.

"The Good Design Award is the result of the extraordinary dedication and talents put forth by our team of engineers and designers of the powerful, efficient and smart 9RX Series Tractors," said Janet Willett, engineering manager for 9RX Series Tractors.

A jury of design professionals, leading industry specialists and media judged and evaluated entries based on criteria established 70 years ago. The criteria considered for the industrial category included: innovative design, new technolo-

gies, form, materials, construction, concept, function, utility, energy efficiency and environmental sensitivity.

Deere offers multiple 9RX Series Tractor configurations, ranging from 470 to 620 engine horsepower. "Our team of engineers worked diligently to deliver the reliable tractor John Deere is known for, and that ultimately helps our customers farm more productively," Willett stated. For validation, multiple 9RX Series Tractors were placed on a six-post accelerated design verification test to shake and simulate the worst-case vibrations that could occur during field and transport.

While designing the 9RX Series Tractors, Willett said Deere engineers were intently focused on improving ride quality and operator comfort. According to the engineer, one of the tractor's most innovative features is its parallel plane four-bar-linkage cab

suspension. "This suspension provides the smoothest ride in the industry for a track tractor and isolates the operator from unwanted bumps and vibrations while reducing operator fatigue," Willett explained.

The 9RX Series Tractors also leveraged a proven sealed-cartridge and mid-roller design used on John Deere 2-Track Tractors for 20 years. "It's a large, reliable undercarriage that supplies outstanding traction in tough field conditions," Willett said.

Regardless of whether a customer requires wheels, two tracks or four tracks, Willett said Deere offers many industry-leading tractor features, including the CommandView™ III cab, Generation 4 CommandCenter™ controls, integrated technologies and the smooth-shifting and quick response of the e18 transmission with Efficiency Manager – designed to help save fuel without compromising performance.



John Deere 9520RX
with 2633 disk.

Image Credit: John Deere



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Mowing equipment is growing in relevance with increased demand for hay and silage. Mike Williams brings you a round up of the latest innovation in mowers in the market.

Image Credit: McHale



The front and rear-mounted McHale Pro Glide mower-conditioners have a 3.1 m wide cutterbar.

Mowing ahead

ONE OF THE reasons for the increased importance of mowing equipment in some areas is the fact that meat and dairy product consumption rises as living standards rise, creating a demand for equipment to increase the production of hay and silage for feeding the extra livestock.

Cutting grass and other crops to produce hay and silage provides the principle market for mowers, but there is also a demand for machines for grass cutting in orchards and plantations plus heavy duty flail type mowers for vegetation control including reclamation projects.

Recent arrivals to the market

Most of the mower manufacturers are long established, but there are also some recent arrivals including the McHale company based in Ireland. They announced their first mower-conditioners for the 2016 harvest, additions to the McHale harvest equipment range which includes balers plus bale wrapping and handling machinery. The three mower-conditioner models are all based on a 3 m wide cutterbar with quick-change knives on the seven cutting discs. The F3100 front-mounted mower and the R3100 version for rear mounting each need an 80 hp tractor and have a 3.5 ha/hour work rate, and the B9000 Combi version

based on two R3100 units plus an F3100 has an 8.56 m cutting width, needs a 250 hp tractor and the potential work rate is about 10 ha/hour.

The McHale conditioning rotor has steel tines and the choice of 700 and 1000 rpm working speeds. The intensity of the conditioning action is adjustable through six settings and the working height of the cutting discs adjusts between 25 and 75 mm.

There is also a demand for machines for grass cutting in orchards and plantations plus heavy duty flail type mowers for vegetation control including reclamation projects.

Also moving into the mower market for the first time is New Holland, which showed pre-production versions of its new mower-conditioners at the end of last year with availability expected later this year. Called the DiscCutter range, the new mower-conditioners will be offered in front and rear-mounted versions using disc cutting units with a 3.15 m working width and the conditioning unit uses V-shaped plastic fingers. The rear units fold hydraulically to a

vertical position for transport and have a hydraulic suspension system, while the front units are mechanically suspended and have folding wings to reduce the width to 2.99 m for road transport.

Kuhn's expanded range

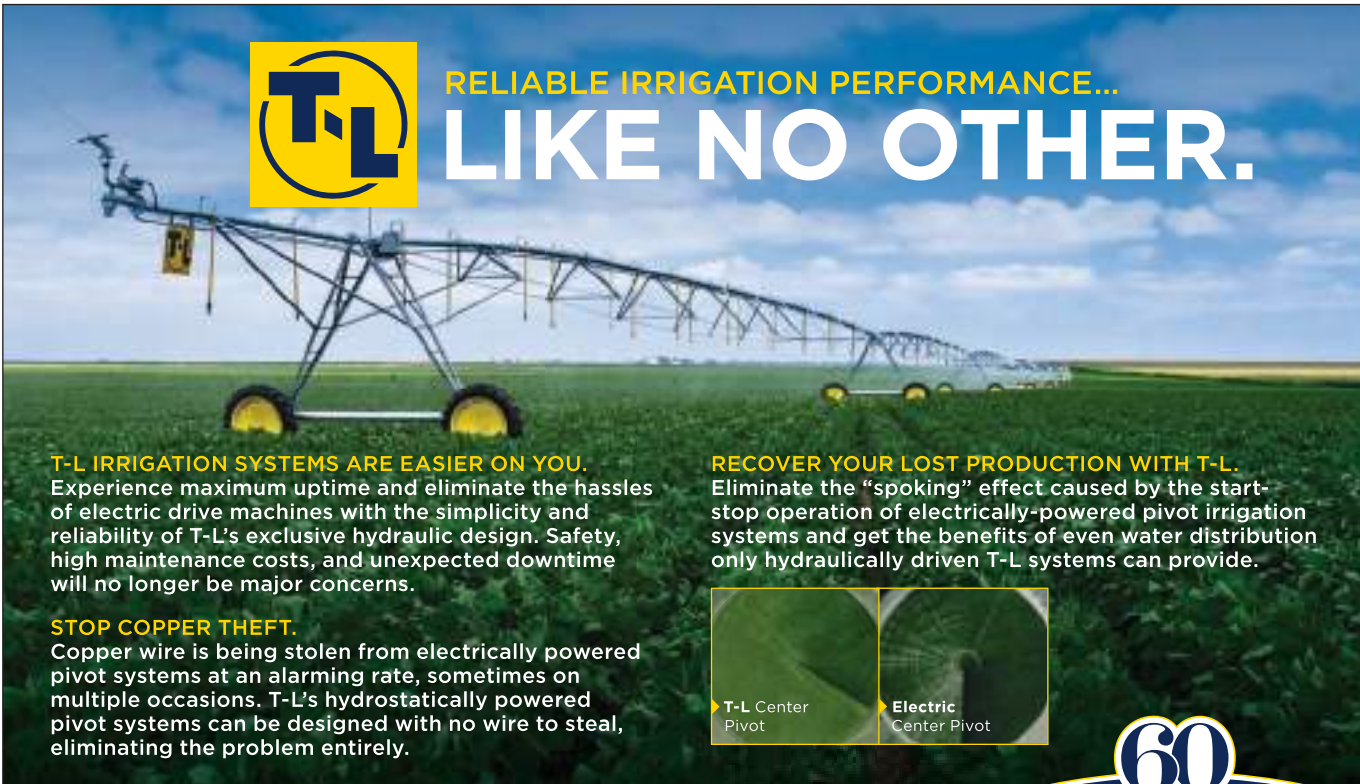
Kuhn, one of the leading European mower manufacturers, has expanded its range of front-mounted disc mowers from four to six models. The new arrivals announced last year are the GMD 3125F and the GMD 3525F, and both are designed to work either as solo machines or as part of a front and rear triple mower combination. They are equipped with the Kuhn Optidisc cutterbar and two p-t-o driven swathing drums that provide a swath width between 1.0 and 1.2 m. The specification also includes the Lift-Control suspension system operating hydraulically to give up to 70 cm of vertical movement for following ground contours.

Also available in the Kuhn range are the FC 3160TCD and FC 3560TCD trailed mower-conditioners that can be used on their own or with a front mounted unit. The design is based on a centre pivot arrangement that allows the machine to work on either side of the tractor, and Kuhn explains that this gives extra flexibility to allow the cutting action to progress across the field instead of working in sections.



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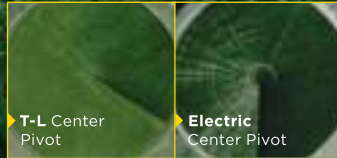
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Widening the conditioning unit choices

A special feature on the John Deere range is the variety of conditioning unit choices including the recently introduced V-10 steel roller unit designed to give a deeper crimping action for dealing with heavy crops. The conditioner based on urethane rollers is exclusive to John Deere, and they also offer a Tri-Lobe steel conditioner for working in situations where high wear rates are a problem, such as areas with abrasive soils. The fourth option is the low-cost impeller system based on tines and suitable for legumes and grass crops, but not for tall crops with thick stems such as cane.

John Deere's conditioner options are available on the trailed disc mowers in a range of models from the side-pull 625 to the 956 mid-pivot version. These are all designed with a gear drive and the entry level 625 version has five cutting discs providing a 2.5 m working width, and the power requirement is 55 to 75 hp. The top model has nine discs on the 4.5 m wide cutterbar and the recommended tractor size is 100 to 150 hp. The specifications include flotation tyres, the cutterbar has a modular construction to simplify repairs and the options include a wide swath kit that assists crop drying by increasing the windrow width by up to 25 per cent and leaving a fluffier swath to allow air movement through the crop material.

A special feature on the John Deere range is the variety of conditioning unit choices.

Comprehensive mower-conditioner ranges

Massey Ferguson offers one of the most comprehensive mower and mower-conditioner ranges including disc and drum



Centre pivot attachment on some Kuhn mowers allows cutting on either side of the tractor.

Image Credit: Kuhn

versions plus front-mounted, rear-mounted and trailed models providing working widths between 1.66 and 9.3 m. The DM series trailed mowers in 3.0 and 4.0 m widths have a centrally controlled drawbar linkage which the tractor driver can swivel to the left or right side to give extra mowing flexibility in awkwardly shaped or steeply sloping fields.

The biggest cutting widths in the Massey Ferguson range are offered by two rear-mounted mower-conditioners, each consisting of twin cutting units with a butterfly folding action. They provide an 8.3 m width with a pair of six-disc cutting units needing 180 hp, increasing to 9.3 m and

228 hp using a pair of seven-disc units and the options include electro-hydraulic controls and a belt transfer swathing system. For smaller tractors the Massey Ferguson range includes rear-mounted M series disc and drum cutting units with widths from 1.66 m upwards and the minimum power requirement for a side hitch mower with five discs cutting 2.55 m is 54 hp.

Innovations in cutterbar design

A recently introduced feature on the Disco mower range from Claas is the Max Cut bed. It is built on a new production line and is described as a unique concept in cutterbar design, with the bed made of only two pieces of steel plate for maximum strength, and with a "wave" shape pressed into the bed to allow the cutting discs to be mounted low down at the front for improved mowing efficiency. The cutterbar design also includes extra wide skids to increase load capacity while reducing wear.

The Max Cut bed is included on all the front-mounted and most of the rear-mounted Claas Disco mowers which provide cutting widths starting with the 2.1 m wide entry level mower to a 10.7 m front and rear combination triple mower. Claas offers both tine and roller type conditioners and for their front-mounted machines they designed and patented the Profil linkage geometry for improved contour following. As well as disc type mowers, Claas also offers the Corto range of drum mowers with working widths from 1.85 to 3.05 m. Front-mounted mowers include the 3200F with a



Trailed centre-pivot mower-conditioners like the DC133 model are a popular choice for crops such as alfalfa.

Image Credit: Case IH

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Image Credit: John Deere

John Deere trailed mower-conditioners feature a gear drive and up to four conditioner options.



Image Credit: Massey Ferguson

Massey Ferguson front and rear-mounted mower-conditioner combination with three 6-disc cutterbars.

3.0 m width, which is also available in a mower-conditioner version.

Triple mower combinations

Pottinger has expanded its range of high output triple mower combinations with the addition of the Novacat A9 model that can be adjusted to provide either an 8.92 or a 9.18 m total cutting width. It is available as a plain mower or as a mower-conditioner with either an Extra Dry tine conditioning unit or Pottinger’s RCB rubber roller conditioner. A special feature of the A9 design is the vibration-free drive system using the Pottinger Y Drive gear train with externally mounted slip clutches to simplify maintenance. Novacat triple mower sets also include the A8 version up to 8.3 m wide plus the range topping A10 cutting 10.2 m at the maximum setting.

The Pottinger mower and mower-conditioner range covers more than 60 different models and versions including rear-mounted discs from 2.2 to 3.88 m

wide, discs for front mounting are available in 2.62 to 3.46 m sizes and there are also trailed disc mowers with 3.04 to 3.46 m widths. Customers who prefer a drum type mower are offered the Eurocat range with front and rear mounting and with 2.7 to 3.05 m widths.

Heavy duty rotary mowers

Heavy duty rotary mowers and slashers for vegetation control work are available in the Baldan machinery range from Brazil. They include three single rotor models in the RD and RDU series with twin blades giving 1.3, 1.5 and 1.7 m cutting widths with a 1038 rpm blade speed. The cutting height adjusts between 50 and 200 mm and the specification includes a chain curtain at the rear to control debris from the rotating blades and the gearbox has oilbath lubrication. Recommended tractor requirements are 61 to 73 hp.


The extra width available in Baldan’s RPDL range makes them suitable for

vegetation control work on larger acreages including cutting the stalk height after harvesting crops such as cotton and maize. The RPDL can be offset or mid-mounted, and this allows it to be used for cutting vegetation and mulching prunings under trees in orchards and plantations. The twin rotors have four blades with 950 rpm rotation, working widths are 2.25, 2.7 and 3.0 m with 65, 75 and 85 hp power requirements, side skids provide the cutting height adjustment and a single rear wheel assists with deck levelling.

The Case IH range

There are 11 mower and mower-conditioner models in the Case IH range with working widths from 1.6 to 4.9 m, and they include sicklebar type mowers suitable for smaller tractors as well as a range of disc machines. For crops such as lucerne and alfalfa, Case IH offers a range of trailed mower-conditioners based on a centre-pivot design and with a disc cutterbar. They can be specified with a flail type conditioning rotor and there is also a choice of steel or rubber roller conditioners.

A different approach to mowing hay and silage crops is offered by the Case IH WD 4 series self-propelled windrowers. There are three models powered by engines with 94, 142 and 168 hp rated output with the power delivered through a hydrostatic transmission. The standard transmission has two speed ranges, and there is also a triple range version with a faster top speed for road travel. Cutting widths are from 6.4 to 12.2 m with a 19 mm minimum height adjustment and the specifications can include single or double swath decks.

The control equipment includes Case IH Accuguide steering guidance providing cutting accuracy to within plus or minus 38 mm. 



A front-mounted Claas Disco mower equipped with a Max Cut design cutterbar.

Image Credit: Claas

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AN ANNUAL GUIDE to suppliers of equipment and services for agriculture and for the primary processing of produce. The first section of the Directory lists suppliers under classification of their products and services. The second section lists alphabetically company addresses.

The third section lists agents and distributors in Africa geographically. The Directory has been compiled from information submitted by the companies concerned.

While every care has been taken to avoid errors and omissions, they may occur; the Editor would like to be notified of these so that the 2019 edition of the Directory can be kept up to date.

Supplier Listings
start on page 38

Agent Listings
start on page 42

Classified Listings

Agricultural Consultancies

Escorts Agri Machinery
ICS

Agricultural Equipment - General

A a Z Performance
Alvan Blanch Development Co. Ltd.
Baldan/Pan Trade Services Ltd.
Case IH
Escorts Agri Machinery
HUNAN XIANGLIANG MACHINERY MANUFACTURE CO.,LTD
ICS
Massey Ferguson
Nogueira/Pan Trade Services Ltd.
ROLLAND

Agricultural Projects

A a Z Performance
Escorts Agri Machinery
ICS
SGS INSPECTION SERVICES NIGERIA LIMITED
Symaga SA

Animal Health Products

Ayurvet Ltd.
Eurofeed Technologies S.p.A.

Antioxidants

Eurofeed Technologies S.p.A.

Applicators for Granular Insecticides, Herbicides

SGS INSPECTION SERVICES NIGERIA LIMITED

Automatic Chain Feeders

Big Dutchman International GmbH

Bagging plant

Awila Anlagenbau GmbH

Bale Handling Equipment

JOSKIN S.A.
Nogueira/Pan Trade Services Ltd.
ROLLAND

Breeding

Hendrix Genetics

Briquetting Plants

Alvan Blanch Development Co. Ltd.

Bulk Storage Equipment

Symaga SA
The GSI Group South Africa (Pty) Ltd.

Cages & Batteries

Big Dutchman International GmbH

Cassava Processing Equipment

Alvan Blanch Development Co. Ltd.

Centre Pivot Equipment

T-L Irrigation Co.

Cocoa Production

Alvan Blanch Development Co. Ltd.

Coffee Processing, Handling & Storage

Swingtec GmbH

Colour Sorting Equipment

Alvan Blanch Development Co. Ltd.

Concentrate Electrostatic Sprayers

Martignani S.r.l.

Consulting Services

A a Z Performance

Conveyors and Elevators

Awila Anlagenbau GmbH
Big Dutchman International GmbH
HUNAN XIANGLIANG MACHINERY MANUFACTURE CO.,LTD
MILLTEC Machinery Pvt. Ltd.

Coolers - Environmental

Big Dutchman International GmbH

Cotton Handling & Storage

JOSKIN S.A.
Swingtec GmbH

Crop Drying and Ventilation

Alvan Blanch Development Co. Ltd.
The GSI Group South Africa (Pty) Ltd.

Crop Handling & Storage

Alvan Blanch Development Co. Ltd.
Swingtec GmbH

Crop Protection Equipment

Martignani S.r.l.
Massey Ferguson
Swingtec GmbH

Cultivators

Baldan/Pan Trade Services Ltd.
Escorts Agri Machinery
LEMKEN GmbH & Co. KG
Massey Ferguson
Monosem

Cultivators - Rotary

Escorts Agri Machinery
Massey Ferguson

Cultivators - Tined

Escorts Agri Machinery
Massey Ferguson

Diagnostics

A a Z Performance

Disinfectants

Eurofeed Technologies S.p.A.
Intraco Ltd.

Drinking Systems

Big Dutchman International GmbH

Dryers

Alvan Blanch Development Co. Ltd.

Egg Collection

Big Dutchman International GmbH

Egg Layer Parent Breeders - Brown

Hendrix Genetics

Egg Layer Parent Breeders - White

Hendrix Genetics

Egg Layers

Hendrix Genetics

Environmental Waste Products

ROLLAND

Exhibitions and Conferences

New Ag International

Extruders for Food, Feed

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Feed Additives

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Eurofeed Technologies S.p.A.
Intraco Ltd.
Unipoint AG

Feed Compound

Eurofeed Technologies S.p.A.

Feed Concentrates

Eurofeed Technologies S.p.A.
Intraco Ltd.

Feed Flavours

Eurofeed Technologies S.p.A.

Feed Ingredients

Eurofeed Technologies S.p.A.
Intraco Ltd.
Unipoint AG

Feed Premixes

Ayurvet Ltd.
Eurofeed Technologies S.p.A.
Intraco Ltd.
Tithebar Ltd.
Unipoint AG

Feed Processing Plants

Alvan Blanch Development Co. Ltd.
Ottevanger Milling Engineers

Feed Supplements

Eurofeed Technologies S.p.A.
Tithebar Ltd.
Unipoint AG

Feeders

TATOMA

Feeding Systems

Big Dutchman International GmbH
TATOMA

Fertiliser Spreaders

Atespar Motorlu Araclar San. Ve Dis Tic. Ltd. Sti.
Baldan/Pan Trade Services Ltd.
JOSKIN S.A.
Massey Ferguson
Monosem
ROLLAND

Fertilisers

Omex Agrifluids Ltd.

Fish Feeds - General

Alvan Blanch Development Co. Ltd.
Eurofeed Technologies S.p.A.

Fogging Machines

Big Dutchman International GmbH
Swingtec GmbH

Foliar Fertilisers

Omex Agrifluids Ltd.

Food & Feed Laboratories

SGS INSPECTION SERVICES NIGERIA LIMITED

Food Processing Equipment

Escorts Agri Machinery
Marel Poultry

Forage Feeding Equipment

ROLLAND
TATOMA

Forage Harvesters

Case IH
Massey Ferguson
Nogueira/Pan Trade Services Ltd.

Forestry Equipment

Massey Ferguson

Forklift Trucks

Escorts Agri Machinery

Fruit Processing

Alvan Blanch Development Co. Ltd.

Generating Sets

Escorts Agri Machinery

Genetic Research

Hendrix Genetics

Grain - Drying & Ventilation

Alvan Blanch Development Co. Ltd.
Awila Anlagenbau GmbH

Grain - Handling, Cleaning & Processing

Alvan Blanch Development Co. Ltd.
Awila Anlagenbau GmbH
MILLTEC Machinery Pvt. Ltd.
Ottevanger Milling Engineers

Grains, Grain Projects & Edible Oils

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Grasscutting Machines -

Forage

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Massey Ferguson
Nogueira/Pan Trade Services Ltd.

Gravity Separators

MILLTEC Machinery Pvt. Ltd.

Groundnut Handling Equipment

Alvan Blanch Development Co. Ltd.

Harrows

Baldan/Pan Trade Services Ltd.
Escorts Agri Machinery

Harvesting Equipment

Alvan Blanch Development Co. Ltd.
Escorts Agri Machinery
JOSKIN S.A.
Massey Ferguson
Nogueira/Pan Trade Services Ltd.
Valtra

Horticultural Equipment & Machinery

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Massey Ferguson
ROLLAND
Swingtec GmbH

ICT Equipment & Services

Big Dutchman International GmbH

Integrated Pest Management

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SGS INSPECTION SERVICES NIGERIA LIMITED
Swingtec GmbH

Irrigation & Drainage Systems

RKD Irrigacion S.L.
T-L Irrigation Co.

Irrigation Equipment

Escorts Agri Machinery
RKD Irrigacion S.L.
T-L Irrigation Co.

Land Clearing Equipment

Massey Ferguson

Livestock Handling

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ROLLAND

Maize Shellers

Alvan Blanch Development Co. Ltd.
Nogueira/Pan Trade Services Ltd.

Manure Composters & Dryers

ROLLAND

Material Handling

Escorts Agri Machinery

Material Handling - Bulk

Escorts Agri Machinery

Meat Processing and Packaging

Marel Poultry

Mechanical Services & Equipment

Massey Ferguson

Medicators

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Awila Anlagenbau GmbH
Ottevanger Milling Engineers

Mills

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Mills - Grain

Awila Anlagenbau GmbH
Nogueira/Pan Trade Services Ltd.

Mills - Grinding

Awila Anlagenbau GmbH

Mills - Hammer

Awila Anlagenbau GmbH
Nogueira/Pan Trade Services Ltd.

Mould Inhibitors

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Eurofeed Technologies S.p.A.

Oil Extraction Equipment

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Palletizers

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Pelleting

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Awila Anlagenbau GmbH
Ottevanger Milling Engineers

Pig Equipment

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MIK International GmbH & Co. KG
Symaga SA

Pig Feed

Eurofeed Technologies S.p.A.

Pig Feeding/Drinking Equipment

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The GSI Group South Africa (Pty) Ltd.

Pig Flooring

Big Dutchman International GmbH
CARFED SA
Eurofeed Technologies S.p.A.
MIK International GmbH & Co. KG

Pig Health Products

Eurofeed Technologies S.p.A.

Pig Housing

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Ploughs - Mouldboard

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LEMKEN GmbH & Co. KG
Massey Ferguson

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Poultry Equipment/Handling

CARFED SA

Poultry Feeding

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Poultry Feeding - Primary

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Poultry Health Products

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Poultry Projects, Integrated

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MILLTEC Machinery Pvt. Ltd.
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Roll-out Nests

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Seed

ICS

Seed Cleaning Equipment

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Omex Agrifluids Ltd.

Tractors

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Escorts Agri Machinery
Hunan Xiangliang Machinery Manufacture Co.,Ltd
Massey Ferguson
Valtra

Tractors - Spare Parts/Attachments

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ICS

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Watering Equipment

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Cameroon - Agrocemac
Egypt - Commercial Group Edward Y. Nekhela & Co.
Egypt - Elyasmengroup (Cairo office)
Egypt - Elyasmengroup (Kafrelsheikh office)
Ghana - Agro Africa Ltd.
Kenya - Agriculture Equipment Kenya Ltd.
Libya - Tasharukiat Agriculture Technology Co.
Morocco - Agri-Art
Nigeria - BD Agriculture Nigeria Ltd.
Senegal - Soproda
South Africa - Big Dutchman South Africa (Pty) Ltd.
Sudan - Sonata Trading Ent.
Tunisia - SEMA Karim Louafi



CARFED SA

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Botswana - Northmec (Case IH BOT)
Cameroon - Kanu Equipment Cameroon
Cote Divoire - Kanu Equipment Cote D Ivoire
Egypt - ECAD
Ethiopia - Ethiopian Agricultural Businesses Corporation-Agricultural Equipment & Technical Services S. Co.
Ghana - Dizengoff Ghana Ltd.
Kenya - Toyota Tsusho East Africa
Lesotho - Northmec (Case IH LES)
Liberia - Kanu Equipment Liberia
Madagascar - SODIREX
Mauritius - Mechanization Co. Ltd. (Mecom)
Morocco - Hydrau Mac
Mozambique - Entrepoto Comercial de Moçambique, SA
Namibia - Northmec (Case IH NAM)
Reunion - Foucque
South Africa - Northmec (South Africa)
Sudan - Central Trading Co. Ltd. (CTC)
Swaziland - Northmec (Case IH SWA)
Tunisia - Agrodis
Uganda - Toyota Tsusho East Africa (Toyota Uganda Ltd.)
Zambia - Agricon Equipment Zambia Ltd. Co.
Zambia - Univem Enterprises Pvt. Ltd.
Zimbabwe - Agricon Equipment



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Rising temperatures put Africa's rice production at risk

A NEW MODELLING study warns that the dry-season irrigated rice in West Africa's Sahel region has reached the critical threshold of 37 degrees Celcius – the tipping point. Further temperature rise could devastate rice yields in this region due to decreasing photosynthesis at high temperatures.

This is an ominous sign as yield reductions will directly translate into severe food shortages in a highly vulnerable

region. Rice has fast become the preferred food of the Sahelian countries – critical for food security and political stability of the region. Rice consumption has been increasing dramatically, mainly because of changes in eating habits and rapid population growth. According to the Intergovernmental Panel on Climate Change (IPCC), the Sahel will experience increasingly higher average temperatures as well as changes in rainfall patterns over the

course of the 21st century. These changes threaten food security and the livelihoods of the region's predominantly rural population.

"Our model shows that without adaptation, irrigated rice yields in West Africa's Sahel region in the dry season would decrease by about 45 per cent, but with adaptation, they would decrease significantly less – by about 15 per cent," explained the lead author Dr Pepijn van Oort, crop modeller at Africa Rice Center (AfricaRice).

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