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Copper for nutrition and crop protection

Cultivators

Stepping up efficiency in tillage

Conservation agriculture

for food security



Agritech Expo Zambia preview. p10



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Copper as a micronutrient is intrinsic to the proper growth and development of the rice crop.

(Photo: Dmitry Naumov /Shutterstock)



Phytochemical feed additives can facilitate healthy, efficient and sustainable animal feeding. p14



The Kverneland iPlough uses GPS technology to adjust the furrow width automatically. p30

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Farming Calendar 2017

APRIL

26-28 Fresh Produce Africa 2017 NAIROBI
www.hppexhibitions.com/horticulture/2017/fpa

27-29 Agritech Expo Zambia CHISAMBA
www.agritech-expo.com

MAY

16-19 NAMPO Harvest Day BOTHAVILLE
www.grainsa.co.za/nampo

24-25 Value Added Agriculture Expo East Africa NAIROBI
www.reedexpoafrika.co.za/ValueAddedAgricultureExpoEastAfrica

JUNE

07-09 IFTEX 2017 NAIROBI
www.hppexhibitions.com/floriculture/2017/nbo

14-16 Agritec Africa NAIROBI
www.agritecafrica.com

20-22 AVI Africa 2017 GAUTENG
www.sapoultry.co.za

JULY

06-07 Aviana Kenya 2017 NAIROBI
www.avianaafrica.com

13-15 Nigeria AgroFood LAGOS
www.nigeriaagrofood.com

SEPTEMBER

15-16 Naivasha Horticultural Fair NAIVASHA
www.naivashahortifair.com

25-27 AgrikExpo 2017 ABUJA
www.agrikexpo.com

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

Unlocking the potential of value addition agriculture

REED EXHIBITIONS IS organising East Africa's the first event to focus on value addition agriculture in Nairobi, Kenya. To be held from 24-25 May 2017 at the Kenyatta International Convention Centre, Value Added Agriculture Expo East Africa is supported by the Ministry of Agriculture, Livestock and Fisheries, Kenya, and will showcase the East Africa Agriculture region by means of promoting the value added products and production thereof for investment and trade opportunities.

Value Added Agriculture Expo East Africa aims to create a business platform for new investors to explore opportunities in East Africa. It also creates opportunities for manufacturers to increase their market share by showcasing their products together with gaining more knowledge on the latest technologies to increase their production of value added products. The event will focus on investment in manufacturing plants to increase value added production, international trade of value added products and will dedicate a segment to knowledge transfer to SMEs wanting to enter or expand their business.

The conference, which is an integral part of the expo, aims to create a dialogue among East Africa government policy and decision makers to increase value added agriculture offerings and decrease critical stumbling blocks in the industry. The conference runs over two full days with day one dedicated for delegates from the manufacturing industry only.

Sub-Saharan poultry industry on focus

WITH THE RECENT opening of the Kigali Convention Center, the capital of Rwanda is set to be the host of the launch edition of Poultry Africa, on 4-5 October 2017. The event, organised by VNU Exhibitions Europe, focuses on connecting African and international producers and suppliers in the poultry and eggs sector with the whole African continent.

Poultry Africa 2017 will be part of VNU Exhibitions Europe's Summit-Expo initiative. These boutique-style and low-cost new series of events will focus on content and technology, by combining a leadership conference and a series of technical best practices seminars, with a complete expo.

Poultry Africa aims to bring together 1,000 visitors from the whole Sub-Saharan Africa. According to the organisers, this is a soon to develop region getting ready to be introduced to new products and innovations.

In Africa, due to a fast growing middle class, rapid urbanisation is driving change. Consumption patterns are changing from a vegetable- to a protein-rich diet. This large-scaled shift urgently requires developments in professional farming and up to date technologies and innovations.

The sub-Saharan poultry market is small, but fast-growing with processed poultry products ranging from 0 to 20,000 tonnes or 10-20 per cent of the market. There is also a growing interest in modern distribution to enable fast growth.

Expansion of processed poultry product markets will require significant investments in cold chains. Several investors are tapping into this market opportunity. Equipment is still relatively basic in the region and equipment demand moves gradually from simple hand labour and manual slaughter lines to mid-sized processing ranges of up to 2 - 6,000 birds per hour.

Poultry Africa aims to create a platform to discuss the potential of and the challenges faced by the growing sub-Saharan poultry industry. The programme of the Leadership Conference will lead visitors through the themes of antimicrobial resistance, avian influenza, poultry welfare and zoonotic pathogens, supported by WVPA. VIV worldwide and partners will also focus on the marketing and trade opportunities in Africa.

Abuja to host Agrikexpo 2017

AGRIKEXPO, ORGANISED BY 151 Products, is Africa's premium business-to-business exhibition and conferences for agriculture and agribusiness professionals and is set to take place at the International Conference Centre in Abuja, Nigeria on 25-27 September 2017.

Agrikexpo 2017, the sixth edition of what has become one of Africa's biggest events for agribusiness development, has continued to rise in profile with a growing number of exhibitors and visitors from all over Africa and the world.

According to the organisers of the event, Nigeria is the choice destination for agribusiness development and investments, given the focus of the government on transforming the sector for food security, increased export earnings, job creation, and other economic benefits. Nigeria is the hub of trade in West Africa with the implication that buyers come from nearby countries to procure from Nigeria. In that regard, there is a great need for new investments, partnerships and appropriate technology, including an increase in value chain activities for quick results.

According to the Nigerian minister of agriculture and rural development, Professor Audu Ogbeh, "Nigeria will do better with new technology, tractors, harvesters, processing and packaging machinery, irrigation technology and commercial-scale agricultural productivity. Over 2,000 tractors are needed in 2016 for cultivation at various levels."

Agrikexpo 2017 aims to bridge this gap and bring the latest technology and innovation to African farmers. The event covers a wide range of sectors including agrimachinery, agrichemicals, aquaculture, crop and livestock management, biotechnology, seeds, forestry, cold chain, irrigation, greenhousing, storage and transportation, processing and packaging.

Biocontrol product to combat aflatoxin in The Gambia

AFLATOXIN POSES A big threat to Africa's food, affecting key staples such as maize and groundnuts, which are common foods across sub-Saharan Africa. To combat the dangers posed by Aflatoxin, AflasafeSN01 has been launched in Banjul, The Gambia. Aflasafe is an all-natural biocontrol product, developed by the International Institute of Tropical Agriculture (IITA), in collaboration with national and international partners.

"The Gambia is amongst the first countries to benefit from Aflasafe registration and commercialisation strategy that will guide local manufacturing and distribution and strategic interventions to enable Aflasafe's uptake," said Matiéyédu Konlambigue, managing director of IITA's Aflasafe Technology Transfer and Commercialisation Project (ATTC). Apart from The Gambia, the product is currently registered in three other countries – Senegal, Nigeria and Kenya.

A situational analysis conducted in The Gambia by the African Union's Partnership for Aflatoxin Control in Africa (PACA) in 2015 revealed low awareness on aflatoxin and its dangers on human and animal health. The assessment showed that the most significant impact of the toxin is on human health.

Speaking on behalf of the minister of agriculture, Omar A Jallow, the permanent secretary of the ministry, Dr Sait Drammeh, said, "The government is aware of the multidimensional negative impacts of aflatoxin. We are deeply concerned with the findings of this study and are committed to ensure the implementation of the recommendations, and the action plan informed by the PACA country assessment. We note with concern our inability to enhance our



Groundnut is one of the major crops affected by aflatoxins. (Photo: Ewais/Shutterstock)

foreign exchange earnings from groundnut exports due to aflatoxin contamination," he said.

He added that computations based on international and actual prices from 2008 to 2014 indicate a cumulative economic loss of about US\$22.8mn, which translates to a loss of US\$1.5mn as an annual average. "Tests conducted in Senegal and The Gambia over the past five years and two years, respectively, have resulted in an aflatoxin reduction level of more than 95 per cent, which is very encouraging. This launch comes at a time when The Gambia is ready to address the issue of aflatoxin as a whole," he said.

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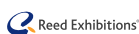
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Parasitic weeds cause US\$200mn loss to Africa's rice farmers

AN INTERNATIONAL TEAM of researchers representing the Africa Rice Center (AfricaRice), the International Rice Research Institute (IRRI) and Wageningen University have revealed that parasitic weeds have an enormous economic impact on rice production in Africa, threatening the food security and livelihoods of millions of resource-poor rice farmers and consumers in the region.

According to the study, smallholder farmers in the continent lose half a million tonnes of rice worth about US\$200mn because of parasitic weeds every year. This is roughly equivalent to the annual rice consumption of Liberia, a low-income country highly dependent on rice imports.

Parasitic weeds are among the most destructive and problematic weeds to control. "When these plants invade food crops, they turn into ferocious weeds," said Dr Jonne Rodenburg, agronomist at AfricaRice. The most important parasitic weed species in rice are *Striga asiatica*, *S. aspera*, *S. hermonthica* and *Rhaphicarpa fistulosa*. They are all endemic to Africa and can also parasitise other cereal crops like maize, sorghum and millet.

The team of researchers also revealed that these parasitic weeds, which survive by siphoning off water and nutrients from host



The areas affected by parasitic weeds are home to some of the world's poorest farmers. (Photo: Chess Ocampo/Shutterstock)

crops, have invaded 1.34 million hectares of rainfed rice in Africa, affecting an estimated 950,000 rural households. They are increasingly becoming severe due to an intensification of agricultural production and climate changes.

Parasitic weeds threaten rice production in at least 28 countries in Africa that have rainfed rice systems. The most affected countries are Burkina Faso, Cameroon, Côte d'Ivoire, Guinea, Madagascar, Mali, Nigeria, Sierra Leone Tanzania and Uganda.

Drones to assist maize breeders

PRELIMINARY FINDINGS FROM a successful breeding programme run by the International Maize and Wheat Improvement Centre (CIMMYT) in Southern Africa show that using drone technology could cut labour and costs spent in collecting data for maize breeding by at least 10 per cent.

With increased demand for better seeds to adapt to changing climate, breeders have turned to unmanned aerial vehicles (UAVs) for precise gathering of data from the field to

enable more efficient maize breeding in most of Southern Africa.

The CIMMYT adopted UAVs to collect data as a critical part of its breeding programme.

According to Mainassara Abdou Zaman-Allah, maize physiologist at the CIMMYT's regional office in Zimbabwe, using UAVs has facilitated instant data gathering. With the UAVs it is possible to collect data from 1,000 plots in ten minutes or less, while it may take eight hours to do so manually.

"In the preliminary analysis that we made, we realised that with the UAV technology, we would spend 10 per cent or less on labour and cost, respectively," said Zaman-Allah.

Zaman-Allah told SciDev.Net in an interview that preliminary analysis shows that greater savings could result if sensors with higher resolution are used. He also pointed out that first tested in 2013, UAVs are now used in maize breeding by CIMMYT in Eastern and Southern Africa, Latin America and Asia.

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MADE IN ITALY

FAO donates lab equipment worth US\$19,000 to fight cattle FMD in South Sudan

IN ORDER TO prevent the spread of foot-and-mouth disease (FMD), UN's Food and Agriculture Organisation (FAO) and the Ministry of Livestock, Animal Resources and Fisheries have launched a two-year joint initiative to start building a progressive control pathway (PCP) in South Sudan. This pathway is the first step for the surveillance, data collection and analysis of foot-and-mouth outbreaks in rural and border areas, according to international standards, to trigger targeted treatment campaigns.

Transboundary animal diseases, like FMD disease, are a constant threat to the livelihoods of pastoralists, and some cases even have serious public health consequences.

"Livestock are important resources, as up to 70 per cent of our population relies on it to survive, and therefore an essential means of economic survival of this nation. There are many diseases affecting our cattle - FMD is one - and if we don't address it, it will restrict the development of our livestock sector. The registration and tracing of our livestock is the way of assuring access to the international market," highlighted James Janga Duku, minister of livestock, animal resources and fisheries, South Sudan.

To realise these interventions, FAO has donated laboratory equipment worth US\$19,000 to help establish a laboratory for testing samples from suspected FMD cases, and enable the identification of the right vaccine.

Moreover, FAO and the Ministry will also reinforce awareness and training on transboundary disease control among a variety of stakeholders to strengthen their ability to react appropriately and prevent the disease.

World Bank announces US\$57bn financing for sub-Saharan Africa

FOLLOWING A MEETING with G20 finance ministers and central bank governors, World Bank Group president Jim Yong Kim has announced a record US\$57bn in financing for sub-Saharan African countries over the next three fiscal years. Kim then left on a trip to Rwanda and Tanzania to emphasise the Bank Group's support for the entire region.

The bulk of the financing - US\$45bn - will come from the International Development Association (IDA), the World Bank Group's fund for the poorest countries. The financing for sub-Saharan Africa also will include an estimated US\$8bn in private sector investments from the International Finance Corporation (IFC), a private sector arm of the Bank Group, and US\$4bn in financing from International Bank for Reconstruction and Development, its non-concessional public sector arm.

In December, development partners agreed to a record US\$75bn for IDA, a dramatic increase based on an innovative move to blend donor contributions to IDA with World Bank Group internal resources, and with funds raised through capital markets.

Sixty per cent of the IDA financing is expected to go to sub-Saharan Africa, home to more than half of the countries eligible for IDA financing. This funding is available for the period known as IDA18, which runs from 1 July 2017 to 30 June 2020.

"This represents an unprecedented opportunity to change the development trajectory of the countries in the region," Kim said. "With this commitment, we will work with our clients to substantially expand programmes in education, basic health services, clean water and sanitation,



World Bank Group president Jim Yong Kim. (Photo: World Bank)

agriculture, business climate, infrastructure, and institutional reform."

The IDA financing for operations in Africa will be critical to addressing roadblocks that prevent the region from reaching its potential. To support countries' development priorities, scaled-up investments will focus on tackling conflict, fragility, and violence; building resilience to crises including forced displacement, climate change, and pandemics; and reducing gender inequality. Efforts will also promote governance and institution building, as well as jobs and economic transformation.

"This financing will help African countries continue to grow, create opportunities for their citizens, and build resilience to shocks and crises," Kim said.

While much of the estimated US\$45bn in IDA financing will be dedicated to country-specific programmes, significant amounts will be available through special windows to finance regional initiatives and transformative projects, support refugees and help countries in the aftermath of crises.

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Zimbabwe staggers under fall armyworm infestation

ABOUT A TENTH of Zimbabwe's maize crop is estimated to have been affected by an outbreak of fall armyworm that has hit at least seven countries in the region, including South Africa, the largest maize producer on the continent. Estimates from the FAO suggest that about 10 per cent of Zimbabwe's nearly 1.3 million hectares of land under tillage were affected by the pest outbreak. Crops in Zambia, Malawi, Mozambique, Namibia and Tanzania were also affected.

Shingirayi Nyamutukwa, acting head of plant protection at the government's

Department of Research and Specialist Services, said all of Zimbabwe's 10 provinces had reported being affected by the caterpillar. It is however difficult to measure the extent of the damage to yields now as crops are at varying stages of growth.

Lack of information about the pest is quoted as a major cause for the amount of damage caused. Zimbabwe Farmers Union director Paul Zacariya said the country was ill-prepared for the arrival of fall armyworm.

"No information or warnings were given to notify farmers of the pest. As such, many



The armyworm outbreak is spreading quickly across Southern Africa. (Photo: Mikhail Kochiev/Shutterstock)

farmers could not identify the pest and lacked the knowledge and requisite skills on how to contain the damages caused," he told IRIN.

Sustainable seed businesses key to improved cassava production

NIGERIA IS THE LARGEST producer of cassava in the world with a production of about 54 million tonnes, but its yield per hectare of cassava roots is about eight tonnes, less than half of the realisable yields of more than 20 tonnes per hectare. According to seed sector professionals, businesses selling improved varieties and high quality cassava stems for cultivation could help African farmers significantly raise their productivity. This could mean more income from the same land, inputs and effort and the benefits of this raised productivity will be enjoyed by all the stakeholders across the value chain.

This was part of the resolutions from a national stakeholder conference on cassava seed system organised by the project, "Building an Economically Sustainable Integrated Cassava Seed System" (BASICS) that was held at the Institute of Tropical Agriculture (IITA), Ibadan.

The meeting, which reflected on the experiences of BASICS in 2016 and refined the project plan for 2017 and beyond, brought together national and international researchers, academics, policymakers, the private sector, non-governmental organisations and farmers to a roundtable.

Making the case for the urgent need for all the stakeholders to work towards a sustainable seed system in Nigeria, Hemant Nitturkar, project director for BASICS, reminded the participants that one of the factors responsible for the low yield of cassava is the low adoption of healthy seeds of improved cassava varieties.

"We have to start with the right planting material and nurture it with good agronomy and weed management practices. Each of these three components has the potential to raise the productivity of cassava by 30 per cent. If we do not improve our practices in seed, weed and agronomy, we are incurring a

lost opportunity of about US\$0.65bn annually from each of the three issues," he explained.

BASICS is commercially piloting two distinct pathways of seed delivery. In one, called Village Seed Entrepreneur (VSE) model, in partnership with Catholic Relief Services (CRS) in Benue and with National Roots Crop Research Institute (NRCRI), in Abia, Imo, Cross Rivers and Akwa Ibom states, the project is helping develop a network of 130 community-based seed enterprises. These VSEs will source certified stems of improved varieties of cassava from NRCRI and IITA to multiply and sell to the farmers in their vicinity. In the second pilot called Processor Led Model (PLM), in partnership with Context Global Development, the project is working with large processors of cassava who will make quality stems available to their outgrowers with a buy back arrangement for the roots produced.

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Agritech Expo Zambia returns to Chisamba for the fourth time this year from 27-29 April with an increased international presence to meet the demands of a booming Zambian agri-sector.

Agritech Expo is Zambia's largest open air agri-business expo. (Photo: Spintelligent)

Spotlight on Zambia focus

ZAMBIAN AGRICULTURE CONTINUES moving with changing times and environment, so does Agritech Expo," Coillard Hamusimbi, the head of services and agribusiness for the Zambia National Farmers Union, the organisers of the upcoming Agritech Expo Zambia says. Speaking ahead of the event he said that farmers should brace themselves for yet another exciting edition of the agribusiness and agricultural technology and B2B platform. The award-winning event returns to Chisamba for the fourth time this year from 27-29 April.

"Agritech Expo has blossomed into an umbilical cord bonding together national, regional and global farmers, agribusinesses, policy makers and development agents as they search for solutions to ever increasing pestilences, adverse weather effects, wasting soil health/fertility, dwindling productivity, inadequate irrigation and mechanisation and increasing stock diseases. Agritech Expo 2017 has been designed to specifically give farmers the innovations and business connections they need to move their farming and agribusiness to the next level," Hamusimbi adds.

The Zambian market is exciting because it is diverse, booming and professional.

Aude Roelly, Sub-Saharan Africa area manager at ADEPTA

Stronger international presence

Last year the event drew a record-breaking attendance of 17,605 visitors. This year even more small-scale, emerging and commercial farmers are expected to descend on the GART research farm in the heart of Zambia's agri-hub, where the latest farming products and services will be showcased. According to the organisers, a key feature of this edition of the show is that it will feature a greater international presence with international pavilions from Germany, Zimbabwe, Czech Republic, the Netherlands, the UK and France already confirmed.

"For four years now the German Agricultural Society has been involved in Agritech Expo Zambia" says Martin Botzian, head of communication at DLG International GmbH. "Since 2016 the German Ministry of Food and Agriculture has organised a German Pavilion and DLG supports this strategic investment, bringing German companies to the No 1 open air expo in Zambia. We see this fair constantly growing from year to year, attracting more and more exhibitors as well as professional visitors and small scale farmers from all over Zambia," he adds.

New at Agritech Expo Zambia this year are official country pavilions from the UK, the Netherlands, France and the Czech Republic.

"The Zambian market is exciting because it is diverse, booming and very professional," says Aude Roelly, Sub-Saharan Africa area manager at ADEPTA, an organisation of 240 French companies

specialised in agriculture and agri-food processing, and convenors of the French pavilion at Agritech Expo.

"We know that agriculture is and will be key in the diversification of the Zambian economy. The vision that is being presented by the Zambian authorities for the development of the sector relies on the private sector (investment, innovation) and the improvement of productivity. Those are very good signs for equipment and machinery providers. The shift in subsidiary, from consumption to production, is also a very good sign that Zambian companies will focus on innovation and value adding and therefore may look into French technologies and know-how," she reiterates.

The Holland Pavilion at Agritech Expo is hosting 18 Dutch companies, mainly active in the poultry and dairy sectors, accompanied by several Dutch knowledge institutions that are leaders in their field of expertise in agriculture.

According to Joost van Dam, director Netherlands Export Combination (NEC) and organisers of the Holland Pavilion, "Zambia will need to acquire resources such as capital, expertise and equipment in order to realise its full potential. Dutch companies can provide some of the required inputs owing to the strong position of the Netherlands in global dairy and poultry value chains."

Accolades for the show

Agritech Expo Zambia recently won two coveted awards at the ROAR Organiser and

Exhibitor Awards in Johannesburg which honour excellence in the exhibition and events industry on the continent. The awards were organised jointly by the Association of African Exhibition Organisers (AAXO) and the Exhibition & Event Association of Southern Africa (EXSA). Agritech Expo won for Best Trade & Consumer Exhibition + 12000 sq m and for Distinction in Social Responsibility.

Zambia will need to acquire resources such as capital, expertise and equipment in order to realise its full potential.

Joost van Dam, Director at Netherlands Export Combination (NEC)

“The Agritech Expo Zambia team is honoured and thankful for the recognition of what they have achieved over the last three years with our partners, the Zambia National Farmers Union building the event from scratch in a field in the middle of Zambia,” says Emmanuelle Nicholls, natural resources group director at Spintelligent, the organisers of the event.




Agritech Expo will feature six international pavilions from Germany, the UK, the Netherlands, France, the Czech Republic and Zimbabwe. (Photo: Spintelligent)

Industrial support and knowledge programme

Agritech Expo enjoys extensive support from the agri industry with well-known suppliers AFGRI and John Deere returning as platinum sponsors. Confirmed gold sponsors are Action Auto, Agricon, BHBW, Case Construction, Case Agriculture, Gourrock and SARO.

As part of its knowledge programme, the show will also offer free workshops again, live machinery and product demonstrations

and crop trials. Special highlights for the 2017 edition will be specialised agri-sector industry zones and mowing and baling demonstrations.

The expo also has an outreach programme at the local Golden Valley Basic School, where, with the assistance of numerous event sponsors, it is assisting the school with much needed infrastructure upgrades, equipment supplies and management of the school’s farm. 









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The integration of new technologies have revolutionised the way turkey hatcheries operate. Phillip Perry, technical advisor at Jamesway Incubator Company, explores the potential of new single-stage technology in improving production in hatcheries.

The future of single-stage technology in turkey hatcheries



The single-stage offers the hatchery manager more control over the operations. (Photo: Jamesway)

A QUICK TIME travel back to a turkey hatchery in 1992 might show you a frazzled hatchery manager frantically trying to get eggs trayed, moving racks into incubator on time, pulling and processing a hatch. Today, with the development of superior incubation technology, the hatchery manager has less to do with the hatchery operation and more with the management of people and processes.

Technology has changed the way the modern turkey hatchery works. A quick look around the hatchery will reveal greater automation. Technology is now available that allows embryos to control their own temperature and hatching needs. Even though they are dealing with a live product, hatcheries collect data and analyse their results.

The single-stage machine puts the emphasis on the machine to perform the procedures for managing the environment of the incubator.

A 'quality hatch' is determined by the data. Hatchability, hatch of fertile, hatch spread, moisture loss, poult yield, cull poult and livability are some of the markers used to monitor the success of a hatchery. Data, once gathered, can be compared to national statistics and rankings.

With all this technology and data available, the subjective view of a 'quality

hatch' has become less and less viable. At one time the hatchery relied on markers such as observation (bright yellow colour, bright eyes, legs, hatch debris, meconium on tray, culls on trays and heavy panting), noise (calm, noisy or agitated poult) or touch (soft, mushy, or hard abdomen). However, managers today spend less time viewing their hatches because they simply do not have the time and rely more on monitors and data analysis.

Servicing the poult for the farms

There has also been an evolution in some of the ways that a poult is conditioned for the farm. The beak trim is a good example. The beak trim is a preventative measure to reduce damage caused by injurious pecking within the flock and designed to

reduce cannibalistic activity. A previous method involved using a hot blade to partially cut and cauterise the tip of the beak. This method was popularly replaced by the bio-beaker or laser debeaker. The poult's beak was pushed into a head holder that contained two electrodes. When both touched the beak an electrical arc was produced and burned a hole through the beak. In a few days the tip would fall off at the rearing farm. Both of these methods were extremely time consuming and relied on skilled application and operation. The introduction of robotics has revolutionised the procedure, application and personnel involved. Custom masks hold the poult's head precisely directing a high intensity light on the beak tip. This allows the beak to wear away in a much more humane and effective manner. Mortality has been significantly reduced and there is a substantial cost saving.

Another servicing procedure that has also seen the benefits of robotics and engineering is claw (toenail) conditioning. Claw removal prevents birds from injuring other birds during high activity. This procedure was once done with a hot blade that cut and cauterised. Modern technology now uses microwaves to remove the nail with minimal tissue damage.

Over the past 25 years, as developments have been introduced, turkey hatcheries have adapted to these new, more humane technologies and methods for performing standard services.

Incubation and hatching

Probably the most instrumental change in the turkey hatching industry has been the shift from multi-stage to single-stage technology. Since the early 90s, the turkey industry has taken hold of the concept. Jamesway Incubator Company states that it has not sold a turkey multi-stage machine since 1994, after it introduced its single-



Phillip Perry, technical advisor at Jamesway Incubator Company. (Photo: Jamesway)

stage machine, the ACI machine, although there are still many hatcheries in operation which continue to use multi-stage machines with good results.

Why the huge shift? The single-stage offers the hatchery manager so much more control. Instead of the success of a hatch being dependent on the manual management of the eggs, now it is dependent on the programmed management of the eggs.

The single-stage machine puts the emphasis on the machine to perform the procedures for managing the environment of the incubator. Once the incubation is programmed the door can be shut until the egg transfer, with a check of fertility at 9-10 days of incubation.

Temperature, CO₂, air velocity and, in the hatcher, maturity, have all been incorporated to produce excellent quality poult. The single-stage machine can maintain egg room conditions until the set is required and it can operate on specifics for the embryo's developing needs. The better hatch results combined with the reduction of management required make it easy to see why it has been called 'worry free' and why the trend has been towards this style of incubation.

Single-stage incubation leads to less cull chicks, improved quality and improved hatch, producing more viable, hydrated and healthy chicks and thereby providing results that exceed those of multi-stage incubation. The results include reduced first week mortality rates, improved growth rate and improved feed conversion.

Compiled data from research studies comparing both techniques not only show improved hatchery results, but displays better results in grow-out data as well. Reduced early and late embryo mortalities present an increase in hatch rates and reduce the number of dead chicks in tray. The ability to maintain total control over the incubation environment attributes to a great increase in chick quality.

The next 25 years?

The future of the turkey hatchery industry is beginning to take shape and we can see that the inclusion of technology and automation, combined with the superior performance of single-stage machines such as Jamesway's Platinum 2.0, will pave the way for the industry to be able to manage the demands of consumer expectations, government regulations, profitability and growth.

The next 25 years should see turkey consumption increasing but with a sound footing on proper bio-security methods and animal welfare. The turkey industry has already chosen single-stage equipment for its future. **E**

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Known for broad-spectrum efficacy, phytochemicals are a promising group of feed additives for the livestock industry.

Phytochemical feed additives as natural performance enhancers

THE CONSUMER'S DEMAND for a transparent and sustainable feed-to-food chain is rising. As alternative feeding programmes receive increased attention among scientists, nutritionists, feed manufacturers and producers, phytochemical feed additives are moving further into the spotlight due to their holistic and broad-spectrum efficacy. Despite the small dosage, they provide a wide range of modes of action, unfolding a huge potential to strengthen gut health and integrity, improve performance while also providing benefits for consumers and the environment.

It is not surprising that natural solutions such as phytochemical feed additives have aroused a great deal of interest and are moving into the spotlight, while the use of antibiotic growth promoters is pushed back by legislation and consumer pressure owing to concerns over health.

Throughout history, herbs, spices, other plants and their extracts have been used for human health and veterinary applications. Today, powerful botanical compounds are accepted in animal husbandry due to their modes of action addressing challenges in livestock nutrition.

"Our aim is to help our customers by developing and providing effective solutions, for producers, animals, consumers and the environment," explains Markus Dedl, CEO of phytochemical feed additive manufacturer Delacon.

The company has built a strong category of science-based phytochemical feed additives around the globe, with proven impact on performance and sustainability, while maintaining feed and food safety. The term phytochemical feed additives was coined nearly three decades ago by Markus Dedl's father, the founder of Delacon, who even then recognized the potential of plants to meet challenges in animal husbandry.



Delacon's phytochemical feed additives facilitate healthy, efficient and sustainable animal feeding. (Photo: Delacon)

Phytochemicals harness the power of nature

Delacon's phytochemical feed additives contain more than 100 natural ingredients being part of many different active ingredient groups, such as essential oils, bitter substances, pungent substances, saponins, flavonoids, mucilages and tannins. "Owing to this wide range, phytochemicals offer much more than just flavoring properties," Dedl says. "The effects are many, mostly targeting the enhancement of livestock performance." Impacts can include sensorial stimulation and palatability, increased enzymatic activity in the intestinal tract, improved nutrient utilisation, antioxidant effects, enhanced quorum-sensing inhibition, effects on intestinal mucosa and improved reproductive performance.

"At Delacon, we have gained scientific expertise in the powerful physiological effects and the specific application of

botanical compounds. Such knowledge is crucial to fully use the power of nature. However, science is only starting to fully understand phytochemicals, particularly potential synergism amongst numerous active plant components," illustrates Dr Jan Dirk van der Klis, Director of Products and Innovation for Delacon. "Notably, phytochemical feed additives based on botanical compounds and plant extracts show wider modes of action compared to chemical, nature-identical single substances, which is due to the synergistic effects of all active components within the plants we use."

"Since the very beginning in the 1980s, we have been discovering the complexity of botanical ingredients and their synergistic effects as none other in order to carefully select and formulate the active ingredients that work best. We strongly believe in the power of nature," states Dedl. "To solve specific challenges, belief is not enough. By proving the effects of phytochemical feed additives in numerous trials all around the globe, we have replaced belief with scientific knowledge." Delacon has supported partners worldwide in the transition phase to become antibiotic-free.

Natural solutions such as phytochemical feed additives have aroused a great deal of interest and are moving into the spotlight, while the use of antibiotic growth promoters is pushed back by legislation and consumer pressure owing to concerns over health.

The animals benefit from strengthened immune systems, reduced occurrences of intestinal inflammation, support for optimal intestinal flora, and reduced ammonia emissions.

Value along the feed-to-food chain


Phytogenic feed additives are addressing the rising demands of various stakeholders along the entire feed-to-food chain. For feed manufacturers, livestock producers and farmers, efficacy may be the most important factor. Improved digestion results in a more efficient use of nutrients from feed, and therefore reduced feed costs per kilogram of animal product. The consistently improved animal performance leads to higher profitability for farmers and producers. The animals benefit from strengthened immune system, reduced occurrence of intestinal inflammation, support for optimal intestinal flora, and reduced ammonia emissions. The environmental benefits include the



Phytogenics can contribute towards profitable and sustainable pig production. (Photo: Delacon)

reduction of methane and ammonia and emissions, by up to 20 and 50 per cent, respectively.

For consumers, it has become a concern to know where their food comes from, how animals are raised, and what they are fed. Besides the maximum safety for consumers as evaluated by the European Food Safety Authority (EFSA), the benefits of phytogenic feed additives resonate positively with consumers. A recent survey among millennial foodies in the US, commissioned

by Delacon, reveals high acceptance for phytogenic feed additives. For 87 per cent of millennial foodies, meat and poultry produced with phytogenic feed additives would make a positive impact on their brand choice. "Phytogenic feed additives are a natural choice for producers, and a cornerstone for both conventional and antibiotic-free feeding programmes," says Dedl. "Furthermore, our survey findings indicate the story of phytogenics resonates with consumers." 



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Innovation in seed coating technology now enables reduced abrasion and homogeneous grain-to-grain distribution. Khaled Raed, innovation manager at PETKUS Technologie, speaks to *African Farming* about the latest air cushion technology in seed coating and its benefits.

A step towards better seed protection

THE GERMINATION AND emergence of sown seeds play a major role in the growth and yield of any crop. It is proven that the biological, chemical and physiological characteristics of seeds affect plant performance and their resistance to environmental conditions.

Enhancing seed performance is therefore of utmost importance to ensure a good yield. The primary way to achieve this is through the addition of chemicals to protect the seed from pathogens. One of the factors that cause reduction in germination percentage and seedling establishment is seed disease. This can be controlled by treating the seed before planting it.

Seed coating is a technique in which several material such as fertilisers, nutritional elements, moisture attractives or repulsive agents, plant growth regulators and pesticides are added to seeds by adhesive agents.

Securing seed quality by means of treating technologies is an area that has been gaining in relevance and popularity. Environmental aspects, legal guidelines and treatment recipes require technologies that minimise dust and grain abrasion. Customary continuous and batch treaters used in the seed coating process regularly lead to increased abrasion. Furthermore, treating and mixing cause stress and grain abrasions reducing germability of the seeds by up to two per cent.

Usually, complex treating recipes for seed coating with high dilution ratios for encrusting and pelleting require separate process steps for treating and drying. With the CM100 MultiCoater, the German technology manufacturer PETKUS / ROEBER has developed a system where the treated seeds are dried in the mixing chamber. This is facilitated by a special air

The biological, chemical and physiological characteristics of seeds affect plant performance and their resistance to environmental conditions.



Dr Khaled Raed, innovation manager at PETKUS Technologie GmbH. (Photo: PETKUS Group)

cushion technology in combination with metal-free deflectors. According to the company, the MultiCoater CM simultaneously treats and dries, improves flow behaviour and guarantees a gentle treatment of seeds with a homogeneous and optimal surface coverage.

The rotor-stator principle is usually applied in the case of conventional treaters. What are the advantages and disadvantages of this principle?

In the case of treaters that function according to the rotor-stator principle, seed is loaded into the mixer batchwise, moved by a rotating turntable and simultaneously sprayed with a chemical agent. This has the advantage that the mixing intensity and consequently the speed are high. The disadvantage is that the grains rub against the stator, are thus subject to stress and become partly damaged. This can lead to the germination capacity that was 97 per cent before treatment reducing to 94 – 95 per cent afterwards. Furthermore, the movement of the rotary plate causes the

seed to move evenly in a circle around the stator wall. In order to interrupt this regular flow and to prevent the spray of the chemical agents from reaching only one side of the grain, metal deflectors were installed in all previous treaters to ensure radial mixing. The rotation causes the seed to hit the so-called deflectors. This results in significant dust abrasions containing active substances.

How were you able to solve these problems with the MultiCoater CM?

We have developed a new system which builds on the rotor-stator principle. However, we have supplemented it with a sophisticated airflow technology. Air is led via nozzles and an adjustable gap between stator and rotor. This creates an air cushion between the stator wall and seeds which dramatically reduces the friction stress. A key challenge was to harmonise the optimum air flow with the force of gravity, ie, the specific weight and acceleration of the corresponding seeds. Grasses, for instance, already float with the slightest air movement. Corn in contrast would be the other extreme. The air must be dosed so that the grains neither fly away nor fall down. At the same time the air flow may not be too strong, thus blowing away the fine spray of the chemical agent.

Therefore, we developed a special control motor where the parameters of the air flow can be set precisely and appropriately for each type of seed. The status is constantly controlled and adjusted by means of the PLC.


Do you still use metal deflectors with your new treaters?

No. In order to support the friction-reducing properties of the air cushion technology, we have not installed any metal deflectors or other edges in the MultiCoater, which could lead to seed damage. Instead, we use elastic deflectors made of plastic whose form is similar to that of an aircraft wing. Optimised aerodynamics direct the seeds to the middle and ensure an excellent mixture without stress.

To what extent do these measures improve the abrasion values and the mechanical stress compared to traditional continuous and batch treaters?

Normally the treating process takes 30 to 40 seconds. In an endurance test we increased the batch time of the MultiCoater to half an hour. This neither led to additional dust, nor were the grains damaged. Using the traditional procedure this test would not have been possible, since the seeds would have been grinded due to the long dwell time in the treater. The test result was confirmed by means of the Heubach test afterwards: all samples were clearly below the statutory limit value.

During intensive treating with high application rates, encrusting as well as pelleting, it is common that additional redrying is required after the coating process. Is this also necessary for the MultiCoater?

No, because treating and drying take place in one step. After the coating process the air quantity in the mixing tank is simply increased so that the chemical agent dries on the seed surface. Thus all agricultural pesticides including dilution, dyes, polymers or other pelleting and coating masses can be applied in only one batch simultaneously, after each other and / or with different treatment times and intensities and they can be dried immediately. Additional stress-promoting transport and process steps are completely omitted. Furthermore, the agent better adheres to the grains due to the gradual and quick drying. Encrustings or pelletings become uniform in size and flawless, without cracks and fractures. Furthermore, dust containing the active substance is discharged from the airflow in this phase. 



The MultiCoater uses elastic deflectors made of plastic instead of metal deflectors that can lead to the damage of seeds. (Photo: PETKUS Group)


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Conservation agriculture, a system of agriculture that strives to achieve high and sustained production levels while concurrently conserving the environment, can play a major role in reducing land degradation and increasing food security. Nawa Mutumweno reports.

Conservation agriculture – key to food security



Conservation farming done well – tall maize, groundnuts and food security. (Photo: Peter Aagaard)

AFRICA COMPRISES A wide range of soils and climatic conditions, with the variety of the continent's soils being of poor quality in comparison with other parts of the world. In many parts of its vast area, inappropriate land use, poor management and lack of inputs have led to a decline in productivity, soil erosion, salinisation and loss of vegetation.

Over the years, African soils have been at risk due to degradation ignited by traditional methods used by farmers (shifting cultivation, nomadic grazing), thus failing to cope with the increasing needs of the ever-expanding human and livestock population. In many parts of Africa, stagnant productivity, population pressure, environmental degradation and the threat of climate change suggest an increasingly bleak future for millions of African families whose livelihoods depend on farming.

This is where conservation approaches, particularly through Conservation Agriculture (CA) come in to contribute significantly to reducing land degradation and increasing food security.

The adoption of CA should permeate to small, medium and large-scale farmers across Africa. CA is becoming increasingly popular as a set of practices by which farmers can dramatically improve their yields, reduce their input costs and conserve the health of their land and soil longer.

Unlike conventional farming methods, such as ridging and ploughing, which fully disturb the top layer of soil, and are usually rushed in the first few weeks following the onset of the rains, CA allows farmers to prepare their land during the dry season, and ultimately protects the soil from unnecessary damage.

By only disturbing the soil where the seeds and inputs will be placed, it works out

more cheaply to prepare the land, and the ability of the land and crop to withstand droughts or heavy rainfall is improved too.

“Combining minimal soil disturbance with smart farming strategies such as crop rotation and residue retention, further boosts the capacity of farmers to generate higher yields and improve their soils. CA works well whether you prepare your land with hoes, plough and oxen or tractors,” said Collins Nkatiko, CEO of Conservation Farming Unit (CFU) in Zambia.

Conservation Agriculture is increasingly dominating debates on agricultural development policy in Africa. It is heartening to note that over the past decade, lots of donor funds have been injected into the promotion of CA to smallholder farmers.

At a joint workshop organised by the Food and Agriculture Organisation of the United Nation (FAO) and other partners in Nairobi, Kenya in June 2008, CA was endorsed as one of the best options to meet future food demands, prevent ecological degradation and ensure sustainable agricultural and rural development.

CA is becoming increasingly popular as a set of practices by which farmers can dramatically improve their yields, reduce their input costs and conserve the health of their land and soil longer.



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"If implemented well, CA methods can improve the efficiency of input, increase farm income, improve or sustain crop yields, and protect and revitalise soil, biodiversity and the natural resource base," the workshop noted.

Further, in July 2013, international experts met in Addis Ababa, Ethiopia to provide a critical analysis of CA practices and opportunities in Africa.

Diversification to more profitable cash crops and overcoming the current inequitable distribution of income along the value chain were considered important steps to alleviate poverty, and encourage farmers to engage in a more cash-based rather than sustainable-driven economy.

CA in practice

CA has been promoted in Zambia since the formation of the CFU in 1995/6 with the practice becoming the "way to go in agriculture" as many farmers are appreciating its benefits.

"Zambia is a leader in adoption of conservation agriculture on small and medium-scale level on the continent, and comes a close second to South Africa at large-scale level," Nkatiko said.

"We see half of Zambia converting to CA by 2030. Our wish is to see the whole of Zambia practicing CA by 2030. By 2030, we see what is CA today, becoming conventional farming," he added.

Conservation farming has been adopted by over 250,000 farmers in the country and it is heartening to note that more are scheduled to adopt the practice in the medium to long-term.

Hans Peter Melby, Deputy Head of Mission at the recently closed Norwegian Embassy in Zambia, said his embassy was happy to have contributed to the success of CA in the country and called on farmers to adopt the practice as it was sustainable and enhanced agriculture even with the changing weather pattern.

"Conservation agriculture is one of the best stories in Norwegian aid. People in other countries are looking to Zambia as a leader in conservation agriculture in Africa," he enthused.

The adoption of CA in Zambia has already improved the livelihoods of tens of thousands of farming families. CFU is also working with partners in Uganda, Kenya, Malawi and Tanzania to promote the practice further.

The First Quantum Minerals programme

Another success story of note is the programme run by First Quantum Minerals (FQM), one of the major players in Zambia's mining industry.

To those living on the periphery of the Kansanshi mine in North-Western Zambia, FQM's conservation farming programme offers a hopeful path from subsistence to self-sufficiency.

Dramatically boosting crop yields, along with participants' sense of pride, the programme is a model for sustainable agriculture in Zambia – and all of Africa.

A recent study commissioned by the African Union (AU) has cited the FQM initiative as an example that all of Africa can follow.

Funded by FQM through its non-profit Kansanshi Foundation and developed in partnership with Zambia's Ministry of Agriculture, the conservation farming programme teaches community members how to grow their crops sustainably, averaging four times the yield of traditional cultivation methods.

"It's a very simple concept, but it really resonates with people. This programme has been an absolute winner in terms of sending people back to their villages empowered with knowledge. We're making huge strides, because conservation farming can be practiced by anyone," said Guy Hammond, the programme coordinator.

"What keeps this programme going is that it's aimed at the heart. We say to the people, 'You are stewards of the land. You've been given soil, water, sunlight, plus your health and your family, in a country free from war. You have everything you need to feed yourself,'" he added.

The way forward

This diversification of crop species grown in sequence (crop rotation) and/or associations (intercropping) are often difficult to realise within African smallholder farming systems. Rather than assuming the universal suitability of these principles or doing away with CA altogether, we need to identify which CA practices suit where, and whether applying them makes sense for farmers.



Land being prepared using oxen minimum tillage in Zambia. (Photo: Peter Aagaard)

A major hurdle of CA adoption is overcoming short-term poverty and resource constraints so that poor farmers can afford to adopt sustainable land management and crop production systems.

Collaboration by various stakeholders including governments, NGOs and research bodies is needed now to rapidly scale-up the African agricultural sector to improve food security and resilience to climate change, the New Partnership for Africa's Development (NEPAD) has said.

It is imperative to identify and develop subsidiary income options in the case where CA practices lead to more spare time due to labour savings. This can be addressed through policy development and some research, but would largely be driven by effective extension services in addition to improved access to credit.

Indeed climate smart agriculture (CSA) is the one of effective and practical routes to a sustained agricultural sector on the continent. CA, as an effective component of CSA is set to revolutionise crop production in Africa if well harnessed.

"Climate change is predicted to have significant impact on agriculture, therefore, constituting a major hurdle for Africa. By adopting CSA practices, smallholder farmers can reduce the risks they face due to climate change, while enhancing food security and livelihoods," said Miti Chikakula, Common Market for Eastern and Southern Africa (COMESA) Agriculture Officer. **E**

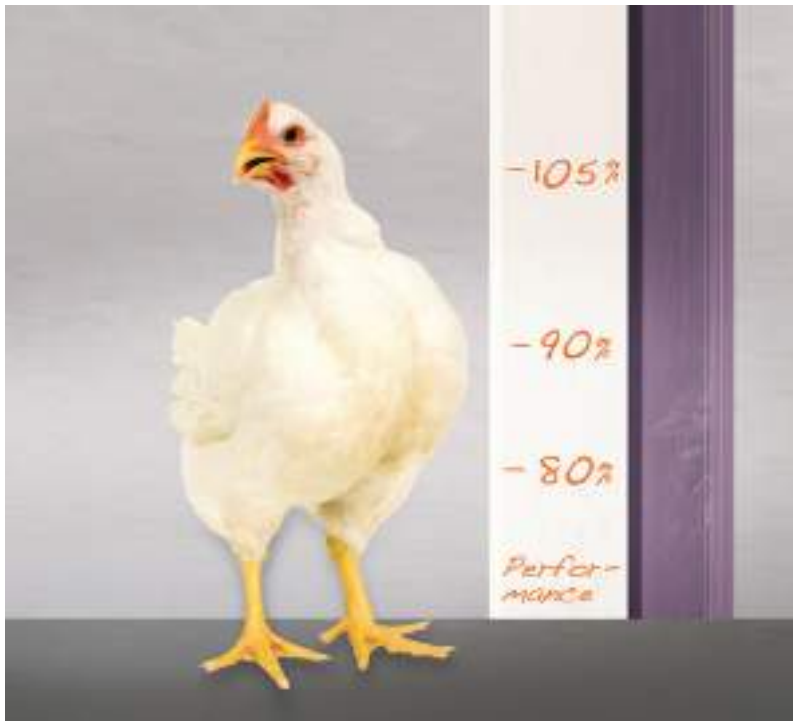
Conservation agriculture (CA)

CA is a combination of tested scientific technologies and/or principles in agricultural production. The practice of CA in Africa is now maturing with increasing demand for more sustainable agricultural practices and better natural resource management and conservation.

Conservation Agriculture, as a concept for natural resources-saving, strives to achieve acceptable profits with high and sustained production levels while concurrently conserving the environment. It is a promising way of attaining sustainable agricultural production. In practice, CA relies to simultaneous application of three basic principles:

- Minimum soil disturbance or if possible, no tillage
- Permanent soil cover, and
- Crop rotations and/or associations

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Reliable irrigation systems, such as those powered by FG Wilson gensets, are essential for ensuring maximum productivity in farms.

Reliability is vital for cropping and dairy farmers whose livelihoods depend on reliable electric power. (Photo: FG Wilson)

Powering irrigation in African farms

FOR FARMERS IN Africa, irrigation is a vital consideration and the availability of adequate water is critical to the success of a growing season. Irrigation systems need to be reliable, which means they need a steady, constant source of electric power.

Over the last 50 years, electricity generator sets from FG Wilson have been supplied around the world with over 600,000 units installed globally since 1990 alone, many for farming applications. In its simplest form, a diesel generator set has a diesel engine

driving an AC generator / alternator which produces an AC electrical output. The engine and alternator are fixed to a rigid steel chassis, which usually contains an 8 – 10 hour fuel tank, enough for a working day.

Now, an FG Wilson dealer in New Zealand, Allight-Sykes NZ, working together with the UK-based FG Wilson engineering team, have configured a power package that is tailored to give electric power to lateral irrigators, and designed to provide more of what farmers need, and less of what they do not.

With many of these generator sets running almost continuously for up to 3,000 hours per season, reliability is key for cropping and dairy farmers whose livelihoods depend on reliable electric power from the machines. This starts with the engine of the generator set: because of the high start-up loads, and relatively low running demand that typify lateral irrigators, engine longevity is assured by the addition of timer-controlled load banks. These are then introduced into the electrical load after a fully programmable delay period from start-up of the generator set. These A-S designed load-bank control units are manufactured for Allight-Sykes NZ as kits by a local switchboard manufacturer and can easily be retrofitted to 13.5 to 22 kVA units by dealer service teams without the need for specialised electrical skills.

The overall package comes complete with durable and robust weather-resistant acoustic enclosures made from galvanised steel for high corrosion resistance and a rugged and reliable engine. For ease of use, the generator sets all have centre point lift and the simple-to-use DCP-10 control panel.

As with all FG Wilson products, the generator sets come with a manufacturer's warranty and lifetime support from the FG Wilson dealer network. **B**

To find out more about the FG Wilson range of generator sets, visit www.fgwilson.com

More than 600,000 FG Wilson generator units have been installed globally since 1990. (Photo: FG Wilson)

Effective grain load assessment is a key factor in optimising silo design, which will in turn definitively impact the silo cost. Ing Carlos Gonzalez Montellano, from the Technical Department at Bentall Rowlands, a UK based silo manufacturer, explains how grain load assessments can be optimised.

Grain load assessment key to optimal silo design

GRAIN STORAGE AT industrial level is usually synonym of steel circular silos made of corrugated wall sheets with vertical stiffeners all around the silo. One of the first steps required in silo design is the estimation of the pressures exerted by the stored material. This is one of the key factors in silo design as it will definitively impact the amount of steel required to build the silo and, eventually, the silo cost.

There are two key alternative design procedures, generally accepted in market. The first is based on the North American code ANSI/ASAE EP 433 "Loads Exerted by Free-Flowing Grain on Bins." This code has traditionally been the most common method used for decades and is generally accepted, even outside the United States.

The second method has only been on stage for the last two decades and is based on the European code "EN 1991-4: Eurocode 1: Actions on structures - Part 4: Silos and tanks", an evolution of the former German code DIN 1055. There is still a lot of expectation and interest on why pressures based on EN 1991-4 seem to be bigger than those based on ANSI/ASAE EP 433, even when the stored material and the silo dimensions are supposed to be the same. To provide an answer to this question, this article analyses the main differences between these two procedures.

Silo classification

Both codes classify the silos according to their slenderness, and different design considerations are used depending on that classification. In the case of ANSI/ASAE EP 433, silos are divided into Funnel Flow (<2) and Plug Flow silos (>2). In the case of EN 1991-1-4, silos are divided into Slender Silos (>2), Intermediate Slenderness Silos ($1 < <2$) and Squat silos (<1).

Additionally, EN 1991-1-4 classifies the silos in three different classes according to their size. Each of these classes is considered to have different reliability of the structural arrangement and different susceptibility to different failure modes. Based on this classification, a different level of rigour is required by EN 1991-1-4 when it comes to the load assessment. A higher rigour normally results in higher pressure values.

Material parameters

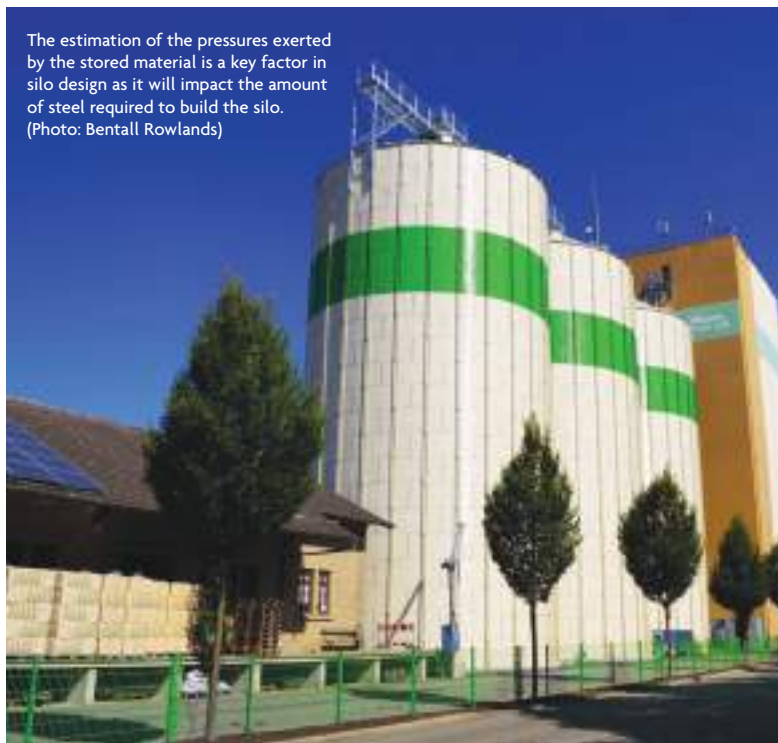
Wheat is in many cases the reference material used for the design of a grain silo, as it is supposed to represent the worst case scenario for a wide range of grains.

Difference in bulk density value is moderate (10 per cent bigger in case of EN 1991-1-4) but bigger differences are found in the lateral pressure ratio (K) (20 per cent) and, more intensely, in the wall friction coefficient (μ) (67 per cent). Differences in the material properties values are, to a great extent, mainly responsible for the eventual differences in grain pressure obtained from the two procedures.

Choosing the right procedure

The differences between EN 1991-4 and ANSI/ASAE EP 433 explain why the pressures obtained from EN 1991-4 are, for a given stored material type and silo dimension and in general terms,


The estimation of the pressures exerted by the stored material is a key factor in silo design as it will impact the amount of steel required to build the silo.
(Photo: Bentall Rowlands)



bigger than those calculated using ANSI/ASAE EP 433. The factor that mostly contributes to the overall difference in the pressure values (and eventually to the final silo cost) is generally the difference in the material properties values considered in both procedures.

At this point, several questions arise as to which procedure should be used in silo design. Is ANSI/ASAE EP 433 accurate enough to ensure a safe structural design for grain silos? Or is EN 1991-4 a very conservative procedure that simply provides a much higher safety margin in the design? Or is EN 1991-4 better for some cases and ANSI/ASAE EP 433 for others?

EN 1991-4 is supposed to be based on most recent advances provided by researchers in the last decades and might be seen as a more accurate method. However, ANSI/ASAE has been extensively used during decades and all over the world, with no particular failures being observed that could be attributed to the design method. To date, no clear answer seems to have been found and probably only time will provide one. But one thing is true: ANSI/ASAE will continue to be accepted in most countries worldwide, whereas EN 1991-4 will remain as the mandatory norm within the European Union.

Bentall Rowlands Storage Systems is one of the world's leading CE Certified, UK manufacturers in grain storage systems. The company has vast experience in silo design according to ANSI/ASAE EP 433 and EN 1991-4, and are flexible to provide a solution that best meets the customer's needs. 

Copper is a micronutrient essential for plant growth and development. Dr Terry Mabbett explores the pivotal role the mineral can play in the cultivation of rice, and looks at the resurgent interest in copper containing products for the nutrition and protection of rice.

There is resurgence of interest in the application of cuprous oxide to rice as a micronutrient, and as a fungicide/bactericide to control a range of highly damaging diseases (Photo: Dr Terry Mabbett)

The role of copper in rice cultivation

COPPER AS A micronutrient (trace element) is intrinsic to the proper growth and development of chlorophyll-containing (green) plants and unrivalled in its pesticide activity spectrum. This covers fungal and bacterial pathogens, lower green plants including algae, and invertebrate animal pests such as molluscs (snails and slugs) that frequent wet places like rice paddies.

Copper is the active constituent of fixed copper fungicides that are routinely sprayed to tropical tree crops for the control of microbial pathogens. Notable examples are *Hemileia vastatrix* (coffee leaf rust) and *Phytophthora palmivora* (pod rot of cocoa), historically regarded as a true fungus but currently described as a “water mould” and more closely related to the algae.

Copper products are not automatically associated with cereals although there is a rich history of copper use in these field crops and especially lowland rain-fed and irrigated (paddy) rice. In the recent years, there has been a resurgent interest in the use of copper-containing products for both the nutrition and protection of rice. A close look at copper use in rice admirably serves to illustrate the more subtle and sophisticated sides of this nutritionally vital and the pesticide-active metallic ion (Cu^{2+} - the divalent copper cation) which is in stark contrast to more common perceptions of copper compounds used purely as contact protectant fungicide sprays to manage foliar diseases of tree crops.

Copper as a micronutrient in rice

The extent to which copper is used as part of an overall fertiliser application programme depends on the copper status of the soil and the inherent responsiveness of a particular crop to applications of copper.

Copper is held strongly by soil organic matter, due to strong absorption of copper by humic and fulvic acids in high peat soils. Exchangeable copper is held very tightly on clay mineral fractions but leaching may be high from very sandy soils. Over-liming of acid

soils causing increased amounts of copper to become complexed by the organic matter fraction, or adsorbed and occluded by hydroxides and oxides in the clay mineral fraction, may also reduce copper availability to crop plants.

For these reasons, a wide range of soils can exhibit a low copper availability status. They include soils with high levels of organic matter (histosols, podzols and humic volcanic ash soils), lateritic, highly weathered soils (eg, utisols and oxisols), soils derived from marine sediments (limestone) and generally calcareous (alkaline reaction) soils, as well as those of a distinctly sandy composition. Cereals are prominent amongst the crops which are most responsive to applications of copper.

The extent to which copper is used as part of an overall fertilizer application programme depends on copper status of the soil and the inherent responsiveness of a particular crop to applications of copper.

Copper deficiency symptoms in rice

Foliar symptoms of copper deficiency in rice may include:

- Yellowing (chlorotic) streaks on each side of the mid rib (centrally located main vein)
- Leaf tips with dark brown necrotic lesions
- Glaucous (blue-green) and chlorotic (yellowing) colouration at the leaf tips
- Distinctive rolling of the new leaves. Newly formed leaves do not unroll (unfurl and flatten). The upper portion has a needle-like appearance while the lower portion appears normal.
- Copper deficient rice plants also suffer from reduced tillering.

Cereals including rice may also experience “sub-clinical” copper deficiency with yields depressed by 20 per cent or more without

plants showing any obvious visible symptoms. "Sub clinical copper deficiency" is easily confused with drought or fungal infections.

This type of deficiency has been shown to cause anther abnormality with accompanying reduced male fertility caused by excessive accumulations of the natural plant growth regulator (hormone) called auxin. Pollen availability is reduced and spikelets become sterile with unfilled grains.

Reasons for this become clear when the key functions of copper as a micronutrient are considered. Magnesium as the main structural component of the chlorophyll molecule has a pivotal role in plant photosynthesis but copper has an equally important behind the scenes function as an essential co-factor in a number of enzyme controlled biochemical reactions.

The most high profile and best understood example is copper as a co-factor for the enzyme polyphenol oxidase. Sub-clinical copper deficiencies inhibit the action of polyphenol oxidase to cause accumulations of phenolic compounds. This in turn inhibits another enzyme called auxin oxidase causing excess amounts of auxin with anther abnormality as a consequence

Crop nutrition and plant health are often closely linked and integrated, and never more so than in the subtle effect of copper as a plant protection agent when applied as a micronutrient.

Contemporary copper as a micronutrient

Copper is not the only micronutrient essential for plant growth and development and is reflected in copper being commonly applied together with at least one other micronutrient. All micronutrients are important but depending on the crop, some are deemed "to be more important than others." In the case of rice, that micronutrient is zinc, which can be applied together with copper as a single product.

One such product is Verno FG (Cu30 + Zn30; 30 per cent each of elemental copper and zinc) from Nordox, the original manufacturer of cuprous oxide as an agricultural fungicide. Verno FG is a foliar fertiliser containing micronised particles of oxides and carbonates as water dispersible granules. The particles adhere strongly to the surface of the leaves and other aerial parts of the rice plant to provide a reservoir of slow release copper and zinc.



Water snails that damage rice plants come within the activity spectrum of the divalent copper ion (Cu^{2+}). Snails' eggs laid on a rice stem above the water line shown here. (Photo: Dr Terry Mabbett)



Green algae relish the standing water in rice paddies and may grow and spread at an alarming rate to choke off the growth of transplanted rice. They can be controlled by applications of copper fungicide (Photo: Dr Terry Mabbett)


As such copper and zinc ions are always "ready and available" at those key stages of growth and development when these micronutrients are required by rice roots and stems. For rice, the product is used at rates of between 200–400 g/ha applied by foliar spray at the beginning of rice stem elongation (Zadok's growth stage 30–32) or 25 days after transplanting.

Copper in rice pest and disease control

Crop nutrition and plant health are often closely linked and integrated, and no more so than in the subtle effect of copper as a plant protection agent when applied as a micronutrient. The production of low molecular mass secondary metabolites called "phytoalexins," with antimicrobial activity and the ability to "prevent" and pre-empt leaf infection by fungal plant pathogens, is well established. Copper ions are known to elicit the production of phytoalexins.

In no way does this diminish the direct control of fungal and bacterial pathogens of rice by fixed copper compounds. Early use of copper as a foliar fungicide and bactericide to control key diseases such as rice blast (*Magnaporthe* sp), bacterial leaf blight (*Xanthomonas oryzae* pv. *oryzae*) and bacterial leaf streak (*Xanthomonas oryzae* pv. *oryzicola*) was over-shadowed by pre-occupation with organo-mercurial fungicides and antibiotics. Neither proved satisfactory from the safety point of view in relation to operators, consumers or the environment.

There is resurgent interest and a renaissance in use of cuprous oxide as a seed dressing or foliar spray for the control of these key pathogens/diseases and other rice diseases such as sheath blight, increasingly important in all rice growing countries and caused by the fungus *Rhizoctonia solani*.

The multiplicity of copper use in rice does not end there because the pesticide potential of copper extends to other plant and animal groups. These include water moulds/Oomycota (*Achylya* and *Pythium*), green algae and molluscs (snails and slugs) all of which thrive in the "aquatic" environment and "lifestyle" of lowland paddy rice. 

Precision in seed placement can go a long way in ensuring good germination, strong root growth and healthy crops that can deliver high yields.

Achieving precision in seed drills

Lemken's Saphir 7 can be used to drill crops like wheat, barley, soya, chick peas, mung beans and fine seeds like canola and tef. (Photo: Lemken)

INACCURATE DRILLING OF a crop can prove very costly to a farmer. Resorting to short-cuts here can very well end up costing dearly during harvest time. Even the best seedbed and growing conditions can deliver disappointing yields or even lead to crop failure if the seed is not accurately placed.

On the other hand, seeds that are placed at the right depth in the soil and at the optimal spacing ensure good germination, strong root growth and healthy crops that can deliver high yields. Plants that are healthy from the start can make the most fertiliser and water, two precious commodities in most African countries; they are also more resilient in times of drought and have greater resistance to pests and disease.

Lemken's Saphir 7 mechanical seed drill aims to overcome these issues of inefficient seed placement with a mechanical metering system is straightforward, well proven and extremely reliable. According to the company, the secret to accurate seed placement depth lies in the parallel linkage and depth wheel combination which means that the seeding unit always follows the ground contour perfectly to keep the seeding depth constant.

The Saphir 7 can accurately drill crops like wheat, barley, soya, chick peas, mung beans and even fine seeds like canola and

tef. The seed drill can be combined with the Zirkon 8 power harrow (also from Lemken) or fitted with a roller frame for solo drilling. The benefit of using the Zirkon 8 power harrow is that it allows farmers to drill and create the seedbed at the same time, saving time, money and precious moisture.

The secret to accurate seed placement depth lies in the parallel linkage and depth wheel combination which ensures that the seeding unit always follows the ground contour perfectly to keep the seeding depth constant.

Trails on seed placement precision

Trials performed by the German-Moroccan Center of Excellence for Agriculture (CECAMA) in Sidi-Silimane have demonstrated the role of precise seed placement in delivering high yields in tough conditions.

In Northern Morocco, at Ksar Lakbir, they drilled a 70 ha plot for canola (rapeseed). Rainfall at the location was sporadic, and the crop grew on only 353 mm of rainfall

out of the normal annual rainfall of 600 mm. Yet, accurate seed spacing and depth placement lead to a 95 per cent germination rate, which in turn translated to a record breaking yield for Morocco of 3,85 tonnes/ha.

In similar trials done by the Zambian-German Agricultural Knowledge and Training Centre (AKTC) in Zambia, the Saphir 7 was used to determine ideal seeding rate for wheat for the area. Having too many or too few plants per hectare can have a massive effect on yields as each plant requires a certain amount of root space, water, fertiliser and sunlight to produce marketable grain.

The Saphir 7 seeding rate can be infinitely adjusted between the maximum and minimum rate without any steps and adjustments are easy to make. What this means for the farmer and plant is that once the ideal seeding rate for the ambient conditions has been established, this rate can be precisely set to maximise yield. In irrigated conditions, a wheat seeding rate of 75kg/ha produced a harvest of 8.3 tonnes/ha, while higher seeding rates consistently yielded less and less. The normal regional seeding rate of 150 kg/ha yielded only 7.7 tonnes/ha. Truly telling evidence that less can be more when working precisely. **E**

Case IH shares the company's experience and expertise about the modernisation of farming practice and the company's future plans for Africa with visitors at the 5th Commercial Farm Africa summit in Tanzania.

Modernisation of farming in Africa



Sugar cane production accounts for approximately 50 per cent of Case IH's activity. (Photo: Case IH)

THE 5TH COMMERCIAL Farm Africa summit has brought together industry professionals from all over the continent to share insights into transforming Africa's agricultural value chain. The two-day event in Dar es Salaam, Tanzania (14 and 15 March) was a valuable opportunity for visitors to hear experts give talks on a wide range of important farming matters.

Speakers at the summit included Tom Davies, Head of Corporate Farming for Middle East and Africa at Case IH, whose presentation provided insight on the topic, "The Modernisation and Mechanisation of Farming Practice."

The summit was opened by Margaret Ndaba, Assistant Director for Development Assistance & International Cooperation from the Ministry of Agriculture, Livestock and Fisheries. She spoke about opportunities in Tanzanian agriculture and set the scene for issues to be discussed during the event. These looked at how public and private sectors can play a bigger role in transforming Africa's agricultural sector by introducing innovative technology to the farm, increasing farm productivity,


investing in agro-related and value-added processing industries and investing in transport infrastructure and post-harvest storage facilities.

Case IH's speaker at this event, Tom Davies, leads the company's Middle East and Africa team responsible for special projects in the agricultural sector. These projects range from smallholding development to multinational corporations' requests for advice or support. Davies said, "our aim is to make the ownership of a large farming enterprise - and in particular the detail mechanising of it - as simple and economic as possible for the highest returns."

In his presentation, Davies described Case IH's successful business approach. He explained how the key elements of this are collaboration with professional producers to develop products, services and complete solutions, focus on productivity enhancements to improve customers' return on investment, continuous investigation and application of technology to minimise the risks of farming, ensuring a knowledgeable network of employees, dealers and distributors, flexible financial services and accessible parts and service support.

With such a strong offering, Case IH is well

established in corporate farming in Africa, but there are plans to build activities further. Davies commented, "the scope of activity will also be widened beyond the preparation of projects, with a strong emphasis on support in the field. This will include a permanent presence during the equipment start-up phase and direct support for parts, technical issues, training and advice."

"Sugar cane production accounts for approximately 50 per cent of our activity and the sugar cane industry is at the core of our strategic plan. We offer a complete range for production, from cultivation equipment to sprayers and the most trusted sugar cane harvesters in the industry. We can also draw on a complete range of products to offer solutions for on-site power generation, construction equipment for drainage or farm roads, industrial-scale material handling, commercial vehicles for transport, and even buses for the workforce. In other words, Case IH provides everything a farmer needs from a single source," Davies added. 

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Ploughs and other cultivation equipment were high on the priority list in the recent batch of company takeovers in the farm machinery industry. Mike Williams reports on the latest industry trends in tillage machinery.

Stepping up efficiency in tillage



The Bomford Dyna-Drive cultivator has two ground driven tined rotors turning at different speeds. (Photo: Bomford)

THE INDUSTRY HAS produced three big takeover deals during the last 12 months, and the companies purchased were all major manufacturers of cultivation machinery, including some of Europe's leading plough manufacturers. Kubota, the biggest Japanese based farm equipment manufacturer, set the trend last year when they took over the Kverneland company, which makes a wide range of machinery including ploughs. They were followed by Amazone, one of Germany's biggest farm machinery companies, which extended its range of products by taking over the Vogel

and Noot plough business based in a factory in Hungary.

The importance of ploughs in the recent takeovers suggests that the new owners expect a long term future for plough sales.

Takeover number three was completed earlier this year when New Holland made a major addition to their farm machinery range by purchasing the agricultural

equipment business previously owned by Kongskilde. The Danish based Kongskilde company is a leading manufacturer of tillage equipment including ploughs and cultivators sold under the Howard, Overum and Kongskilde brand names.

The future of ploughing

In spite of the increasing interest in minimum cultivation methods, the massive reduction in plough sales that some experts predicted has so far failed to develop, and the importance of ploughs in the recent takeovers suggests that the new owners expect a long-term future for plough sales.

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Although increasing use of minimum cultivation means many farmers worldwide have reduced the amount of land they plough each year, the policy is often to continue ploughing some of the farm each year to deal with problems such as crop residues or weeds.

Another factor helping to maintain interest in ploughing is the steady flow of design improvements, and an example in the Kubota owned Kverneland range is the iPlough introduced earlier this year. The iPlough, available initially in four to six-furrow versions, uses GPS technology with an Isobus control system to adjust the furrow automatically on the move. This can compensate for irregularities caused by working around an obstruction such as a tree, or following an erratic field boundary, and the control unit can also be used to adjust the angle of the plough and the depth wheel setting. The iPlough has a 280hp headstock and there is a choice of shearbolt or auto-reset protection.

Vogel and Noot produced one of Europe's leading plough ranges and the new owner, Amazone, said their policy was to integrate the Vogel and Noot ploughs into the Amazone range. This means that Amazone now offers a full range of ploughs from two to 12 furrows instead of being restricted to the five and six-furrow sizes previously available in their Cayron plough series.

Innovations in disc harrows

As well as ploughs, the Amazone range of tillage machinery also includes Catros series disc harrows, available in mounted and trailed versions with working widths from 3 to 12 m. The 12 m Catros 12003-2TS model is a recent addition to the range, featuring a main frame designed in sections. The sections are under hydraulic pressure to ensure efficient contour following over uneven surfaces, and the 510 mm diameter discs are individually suspended and have notched edges to improve the cutting and mixing action. The working depth is adjustable between 5 and 15 cm and the folding action reduces the overall width to 3 m for transport. The recommended power requirement for the new 12 m discs is 360 hp.

Disc harrows are a popular cultivation choice because they suit a wide range of soil conditions, they can handle surface trash including crop residues, and they have an effective mixing and tilth-forming action that can be controlled on many disc harrows by adjusting the disc angle and the working depth. Demand for used equipment can be a good barometer to show farm machinery trends, and UK-based Ellis Machinery says disc harrows are a

The Kverneland iPlough uses GPS technology to adjust the furrow width automatically. (Photo: Kverneland)



popular choice with many of their customers in Africa. Ellis Machinery is a specialist supplier of used farm equipment with more than 25 years' experience of shipping machines to customers in Africa. "The wide range of crops and soil conditions in Africa means there is a demand for most types of cultivation equipment," explained Tristram Ellis, African market specialist at Ellis Machinery, "but in our experience there is always a steady demand for disc harrows and they can produce good results in a wide range of conditions," he said.

Disc harrows are a popular cultivation choice because they suit a wide range of soil conditions, can handle surface trash including crop residues and have an effective mixing and tilth-forming action.

Probably the biggest selection of disc harrows is available from the Brazilian based manufacturer, Baldan, which has been making farm machinery since 1928. They are now a major exporter, selling cultivators, drills and other equipment internationally including 15 African countries. Baldan was the first Brazil-based company to make disc harrows and disc ploughs back in 1952, and it now offers 28 different disc harrow series in a wide range of widths and specifications to suit almost any soil condition.

Recommended power requirements for the Baldan disc harrow range start at about 25 hp for the smallest of the HI series mounted models with a 1.8 m working

width, and the GCRTI trailed series is available in three widths from 8.5 to 10.7 m wide for tractors in the 280 to 380 hp range. The top model in the heavy duty GDOB series offset double disc harrow series, designed for deep cultivations and difficult ground conditions, has a 12.32 m working width, weighs 14.2 tonnes when equipped with the largest diameter disc option and is suitable for tractors from 500 to 535 hp.

The importance of working depth control

The Lemken range of cultivation machinery includes the Heliodor 9 series compact disc harrows, with additional models announced last year to cover working widths from 2.5 to a massive 16 m, which is said to be the largest machine of this type available worldwide. Other new Heliodor 9 developments include extending the disc diameter to 510 mm, resulting in a longer life and increasing the maximum working depth to 14 cm, and the options list includes an in-cab adjustment for altering the working depth.

The hydraulically operated working depth control is standard equipment on Lemken's Karat 12 semi-mounted stubble cultivator with four rows of tines and working widths from 4 to 7 m. Using the correct depth setting for a cultivator is important, says Lemken's Christian Schlotfeldt. The usual policy for some operators is to choose the deepest setting the tractor will pull, but this can be a costly mistake, wasting fuel and time, adding to maintenance costs for the implement and tractor and also increasing the amount of moisture lost from the soil. Instead of "as deep as possible", the depth guideline should be "as deep as necessary, but as shallow as possible". One of the reasons for incorrect depth settings, Schlotfeldt says,

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is that some cultivators do not have adequate depth control systems. Another problem is that the tine and shank geometry on some cultivators is designed to work efficiently with a specific depth range and this can mean that the scope for depth adjustment is very limited.

Applications of rotary cultivators

A different approach to soil cultivation is provided by the rotary action of the Dyna-Drive built in the UK by Bomford Turner. The Dyna-Drive is designed for versatility and simplicity, using two-tined rotors with a ground drive system to avoid using the tractor p-t-o. The front rotor has tines that provide a digging and lifting action while also operating a heavy-duty chain drive to the rear rotor. The rear rotor, turning three times faster, has tines that provide secondary cultivation and levelling. Advantages claimed for the Dyna-Drive two-in-one action include a maintenance-free drive system, the power requirement is about 32 hp per metre and typical working speeds are in the 12 kph range. Working widths are from 1.6 to 6.0 m and this year's new additions to the range are 4 and 6 m models that fold for transport.

The usual policy for some operators is to choose the deepest setting the tractor will pull, but this can be a costly mistake, wasting fuel and time, adding to maintenance costs and also increasing the amount of moisture lost from the soil.

Mounted cultivators driven by the tractor p-t-o and using a rotor with tines or L-shaped blades offer a number of benefits including the ability to chop a wide range of crop residues plus an efficient mixing action that can incorporate manures or chemicals into the soil. Howard rotary cultivators made by Kongskilde and now part of New Holland's machinery range, are available



A Lemken demonstrator in South Africa explains the depth control system on a 3 m Karat cultivator. (Photo: Lemken)

in a wide range of sizes including narrow widths for specialist applications such as working in vineyards or vegetable and fruit production, with wider versions for general seedbed preparation. The newest additions, announced last year, are the R2.500 series available with a standard specification with

redesigned, and the HD models have a gear drive to the rotor instead of the chain drive on standard models.

Recent additions to the French built Kuhn range of p-t-o driven cultivators include the EL402 R, a 6 m wide rotary cultivator that folds to 3 m for transport. The rotor is equipped with 144 carbide steel blades and the specification includes the Kuhn Intelligent Monitoring System that displays operating data such as torque loadings and the gearbox oil temperature inside the tractor cab. Kuhn has also announced two new additions to their p-t-o operated power harrow range. The HR6040 R has a 6 m working width, increasing to 8 m for the HR8040 R, and both fold to reduce the width for transport.

Ploughing continues to be the popular method of primary cultivation, especially on smaller farms, according to John Deere. A three-disc plough pulled by a John Deere 5075E tractor is the established approach for many small acreage farmers, but on the larger commercial farms in South Africa and Sub-Saharan Africa generally the trend is away from traditional ploughing.

Methods vary of course, a John Deere spokesman explained, but many of the larger farms are now combining deep ripping with a secondary tillage application that helps to manage water availability as well as preparing a good seedbed. John Deere's 2410 chisel plough has recently been introduced into South Africa for the initial stage in this cultivation process, and the rugged design is proving a success in a wide range of conditions. The 2410 also features AccuDepth control that automates the implement set-up process through the customer's GreenStar display, offering opportunities to adopt additional precision farming developments in the future. 

widths from 1.25 to 2.55 m, and there is a Heavy Duty (HD) version with 2.05 to 3.05 m working widths. Tractor requirements are up to 100 hp for the standard models while the HD cultivators are designed for 140 hp maximum. Special features on R2.500 models include a new QuickFit attachment system allowing a blade to be replaced in a few seconds, the driveline protection is

Howard R2.500 series rotary cultivators from Kongskilde have the new QuickFit blade attachment. (Photo: Howard)



Driving excellence in farming machinery

TILLAGE IS A complex process, comprising many different interacting factors. For this reason, it is important that the companies involved in constructing of farming machinery follow the global trends on the agricultural market closely. Farm machinery company, SaMASZ attributes this to its success. The company stated that its long-time experience enables it to see things that are not apparent to those who are less aware of the trade. Up until now, SaMASZ has managed to manufacture more than 95,000 mowers and other farming machines.

SaMASZ commented that it is dynamically developing, driven forward by a passion to create new, top-quality machinery. The company, which has been in the market for 30 years has been manufacturing not only farming machinery, but also offers a wide range of municipal machinery, such as extension arms, flail mowers, snow ploughs and gritters.

The company prioritises putting passion into its products and closely collaborating with its clients, so that its machines meet the most important needs of farmers. One of the key factors in farming today is the cleanliness of the harvested fodder, achieved using highly accurate mowing mechanisms. Clean fodder, is the most valuable feed for the cattle, and SaMASZ ensures that the use of its machines ensures collecting clean crops.

In 2015, SaMASZ set the Guinness World Record for mowing an area of 96.2 ha using a set comprising three disc mowers, within eight hours time. According to the company, this is testament to the record making capacity of its machinery.

SaMASZ cooperates with more than 50 entities in Poland and 70 abroad. In 2014, it entered the Russian market by establishing the



SaMASZ has manufactured more than 95,000 mowers and other farming machines to date. (Photo: SaMASZ)

SaMASZ RU Company and in 2015 opened its first dealership across the ocean – SaMASZ North America LLC based on extensive dealer network, through which it consequently channels machinery. Its main export markets are: Germany, Russia, Latvia, Finland and Ireland. SaMASZ machines are also delivered to markets such as Turkey, Albania, Saudi Arabia, Japan, South Korea, Peru, Canada, Australia, New Zealand, Algeria and many others.

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Massey Ferguson debuts the world's first 200 hp four-cylinder tractor

MASSEY FERGUSON DEBUTED the new MF 6700 S Series, which includes the world's first 200 hp, four-cylinder agricultural tractor, at the SIMA show debut in Paris, following its preview in France last year.

The MF 6718 S enters the market with assurances of unrivalled four-cylinder power, manoeuvrability and agility. The tractor also features Massey Ferguson's new 'S Effect,' which takes the maximum four-cylinder engine output to 200 hp (with engine power management) for the first time.

The tractor uses a compact, 4.9 L four-cylinder engine, 2.67 m wheelbase and a turning radius of just 4.75 m, making it the most manoeuvrable 200 hp tractor.

"Massey Ferguson invented the concept of the high power, four-cylinder tractor, with the original MF 6600 breaking new ground and creating a completely new class of 150hp+ tractors. Now, with the 'S effect' we are further advancing performance in this sector up to 200 hp on the MF 6718 S," said Massey Ferguson Marketing Services Director Campbell Scott.

The MF 6718 S has an impressive turning radius of just 4.75 m. (Photo: Massey Ferguson)



He added that the advanced engine develops its maximum power at just 2,000 rpm and generates maximum torque at 1,500 rpm, which means it delivers exceptional fuel economy combined with superb pulling power – and with plenty in reserve. This provides users with the operating benefits associated with larger, longer and heavier six cylinder tractors, but in a compact and extremely light machine.

There are six new models in the MF 6700 S Series, which offer maximum powers from 120 hp to 175 hp and all benefit from Electronic Power Management (EPM), which provides an extra 25 hp on all models.

"The only comparison with the MF 6600 Series is its looks. The MF 6700 S Series contains considerable changes and new developments in engine design, transmission choice, hydraulic output, four-speed PTO and superb cab comfort," Scott pointed out.

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