

ProAgri

BOTSWANA/NAMIBIA/ZIMBABWE

No 41

Free

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Botswana
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Exploring African soil

I had the privilege of visiting several farmers in Pandamatenga, Botswana, at the end of January. Pandamatenga is one of parts of Botswana most suited to dryland farming. Locals call the village Panda.

The six silos that can be seen when passing through Panda are the only landmarks and indications of civilisation, you really can miss it, if you blink! Even though it is small and would miss the average person's radar, the village and its surroundings are magical and surreal.

The village relies mainly on agriculture. About 46% of Botswana has been zoned for agricultural production and is cultivated by both large-scale commercial farmers and smaller subsistence farmers in the area. The major constraint to crop production is the lack of adequate rainfall.

Major crops grown in Botswana are sorghum, maize, millet, and cowpeas. Since most of the farmers in this area regularly experience drought, they rely on irrigation to make their farming efficient and profitable. Not only is crop farming popular in Botswana, but livestock farming as well, which includes cattle, sheep and goats.

Although there is huge potential for growth in the African countries it is sad to face the challenges of diseases, a lack of private sector investments, a lack of capacity to invest in operations and infrastructure, *et cetera*.

A recent statement of the Agricultural Finance Scoping claimed that the main

agricultural-related objective and the new vision of 2036 for Botswana are to develop a sustainable, technology driven, commercially viable, disease-free agricultural sector which optimises land and other resources.

Well, not only is this vision my wish for Botswana, but for all the African countries and the thriving farmers out there.

Africa is endowed with the most amazing wildlife and infused with rich and diverse cultures. What an incredible experience it was to explore African soil, indeed.

We hope you enjoy this month's edition of ProAgri BNZ. Be sure to visit our classifieds website, www.agri4all.com to get your hands on all your agricultural supplies, and for our readers, take a scroll through our website, www.proagrimedia.com for some informative articles and our farmers' testimonials. Subscribe to our social media platforms and YouTube channel to make sure you don't miss a thing!

Keep an eye out for the brand-new video series to be launched soon: Reinke's circles of success in Botswana.

I would love to hear from you, send me an e-mail to bianca@proagri.co.za and please get in touch with me.

ProAgri greetings
Bianca Henning

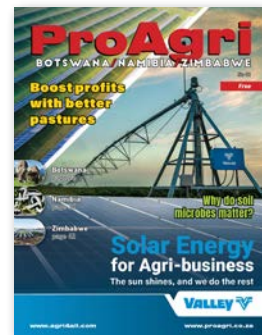


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Cover

Driven by one of the most trusted names in agriculture, Valley Irrigation uses the sun's energy to power your agribusiness, providing your operation with a new level of energy independence.



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Valley® Gensets keep your operation running when there is no electricity

Article supplied

Valley® is the founder of the entire pivot irrigation industry. We have helped generations of growers to overcome watering challenges with the most durable machines and the most reliable technology available. Our passion for agriculture is clearly seen in the numerous solutions we have created to help growers in every aspect of their operations.

It therefore comes as no surprise that we have also established ways to help growers, to generate electricity, which is becoming more crucial under current circumstances. We have Ag Solar by Valley® - offering solar solutions to growers and Valley Diesel-Powered Gensets®, that we will focus on in this article. Valley® Gensets come with a 12 month warranty and are approved by the highest quality standards. Each Genset is assembled on order to ensure that you are getting the best quality product for your investment.

Diesel-powered generators from Valley® Irrigation are ideal to meet the water application needs of farms utilising irrigation machines, including all ancillary products, such as pumps. These reliable generators are capable of working as a farms' main electrical source, or as a standby unit where the main electrical supply is weak or unreliable.

The ratings range from 9 kVA to 500 kVA, and even units available in a trailer-mounted configuration. Other key features include a durable design and the ability to handle overloads of up to 300% during start-up.

Prime power

These ratings are applicable for supplying continuous electrical power (at

variable load) as an alternative to commercially purchased power. 10% overload power is available for 1 hour out of 12 hours of continuous operation.

Standby power

These ratings are applicable for supplying continuous electrical power (at variable load) in the event of a utility power failure. No overload is permitted on these ratings.

Motor starting

The permissible overloads are 300% for 20 seconds, 50% for 2 minutes and 10% for 1 hour out of every 6 hours of operation.

Standard reference conditions

Output ratings are presented at 25 °C air inlet temperature, barometric pressure 100 kPa, relative humidity 30%.



These generating sets are designed to operate at high ambient temperatures (up to 55 °C), humidity (up to 99%) and higher altitudes.

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VME Part N°	Genset Model	Prime Rating 50 Hz (Kva)	Prime Rating 60 Hz (Kva)	Engine	Alternator	Dimensions		
						L (mm)	W (mm)	H (mm)
5120093	JP9	9	11	PERKINS	MECCALTE	1910	860	1222
5120094	JP13	13	16	PERKINS	MECCALTE	1910	860	1222
5120139	JP15	15	18	PERKINS	MECCALTE	1910	860	1222
5120095	JP20	20	24	PERKINS	MECCALTE	1910	860	1222
5120125	JP30	30	35	PERKINS	MECCALTE	2120	970	1520
5120126	JP45	45	50	PERKINS	MECCALTE	2300	1110	1520
5120127	JP60	60	68	PERKINS	MECCALTE	2300	1110	1520
5120128	JP80	80	90	PERKINS	MECCALTE	2300	1110	1520
5120129	JP100	100	110	PERKINS	MECCALTE	2770	1110	1520
5120130	JP135	135	150	PERKINS	MECCALTE	3520	1110	1800
5120131	JP150	150	165	PERKINS	MECCALTE	3520	1110	1800
5120132	JP200	200	245	PERKINS	MECCALTE	3900	1430	1980
5120133	JP250	250	280	PERKINS	MECCALTE	3900	1430	1980
5120134	JP300	300	335	PERKINS	MECCALTE	4700	1630	2010
5120135	JP350	350	400	PERKINS	MECCALTE	4900	1630	2190
5120136	JP450	450	500	PERKINS	MECCALTE	5190	1630	2190
5120142	JP500	500	500	PERKINS	MECCALTE	5190	1630	2190

Additional features:

- Synchronized models
 - Larger fuel tank
- Additional fuel / water separator
- Battery disconnect switch

Quality standards:

BS4999, BS5000, BS5514 IEC, 60034, VDE0530, NEMA MG 1.22 and 8528

Key features:

- Durable design
- Handles overloads of up to 300% during startup
- Ratings range from 9 kVA to 500 kVA
- Available in trailer-mounted configuration



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Farmers depend on Rumax to make top class feed

by Maryna Steyn

The vital key to success in animal husbandry is feed. Therefore, more and more farmers rely on Rumax to provide their animals with nothing but the best.

Jaco Pieters started Rumax in 1999 by designing and manufacturing hammer mills. Later on, the company also ventured into feed mixers, manure spreaders and feed pelleting machines. Now, two decades later, the Rumax brand brings farmers a full range of feed-making equipment.

"I began small, making the hammer mills under a canopy," says Jaco. "From there I expanded and also added new products to the range we manufacture." Currently, all machines are made in our factory in Worcester, in the Western Cape province of South Africa.

"Initially, many of our clients were dairy farmers, but that also changed over the years. Our products provide solutions to cattle, sheep and game farmers all over the sub-continent including Zambia," he says. "A couple of machines were also ordered from Kenya and Australia."

Rumax machines have competitive advantage over overseas machines

When the rand weakened significantly in the early 2000s, Jaco saw the need that farmers had for feed mixers. "They needed feed mixers that could help them farm more profitably, but the cost of importing expensive mixers from overseas was too high," Jaco explains.

Locally produced products not only fill this need, but also have the added benefit of understanding the farmer's unique needs. After all, these needs change depending on your type of livestock, field conditions and climate, meaning no two farmers have the same needs. "Our customers can say 'I need the controls to be on the side,' then we can manufacture it that way," he elaborates. "In this way, we manufacture the best machine for every farmer."

Local means Rumax provides excellent service and spare parts are easy to obtain

Every piece of these machines is manufactured in-house in the factory. "Whether it may be a sprocket, gears or gear boxes, it is made here by us," Jaco adds. "The benefit of this is that parts are readily available."

This eliminates the struggle of finding chains and other parts for foreign machines.

"We aim to provide farmers with high quality and reliable machines, that can work hard. They need to be dependable, durable and relatively maintenance free to ensure as little down-time as possible," he explains. "That is why so many farmers from other African countries import our machines."

They know they have a reliable supplier who provides top class machines and excellent after-sales service wherever their machines are working.

Rumax makes a difference in feed production

During the recent drought in South Africa, many farmers have benefited from using their Rumax feed mixers. "Sheep farmers in particular find our machines practical because they cut material very finely," Jaco explains. "The 7 m³ feed mixer was specifically made with sheep farmers in mind, but it is a good choice for any farmer. It is a good average size and affordable as well."

Rumax offers a collection of machines for animal feed production:

Full-feed mixers

Rumax feed mixers are available in various models to suit the needs of any farming enterprise. Capacities range between 5, 7, 9 and 15 cubic metres. It is used to mix feed rations and transport the feed to where the animals are fed.

Concentrate mixers

Similar to the feed mixers, these



The Rumax round-bale mill mills a giant round bale in only seven minutes.

machines help in producing special concentrate mixes. Rumax produces a half tonne mixer, powered by a single-phase 3 kW motor. There are also 1 t and 1,5 t mixers with 5,5 kW motors, as well as a mixer with a two tonne capacity with a 7,5 kW motor.

Hammer mills

Rumax manufactures a variety of hammer mills. The smallest of the hammer mills, the BD32, is has a 3 kW motor. It can be manufactured with a single-phase motor, a three phase motor, or a diesel engine.

The BD55c is the most popular Rumax hammer mill equipped with a 7,4 kW motor. This machine has a milling speed of 3,5 t/h.

The BD55 has a motor of 22 kW and a milling speed of 11 t/h.

The BD90 is the largest in the BD-series and offers a high output of milled materials. It runs on a 37 kW motor and produces 15 t/h.

The round-bale mill is powered by a 37 kW motor and takes approximately seven minutes to chop an entire round bale.

Pellet machines

Rumax also manufactures pellet machines, giving farmers the option of producing their own feed – from plant to pellet.

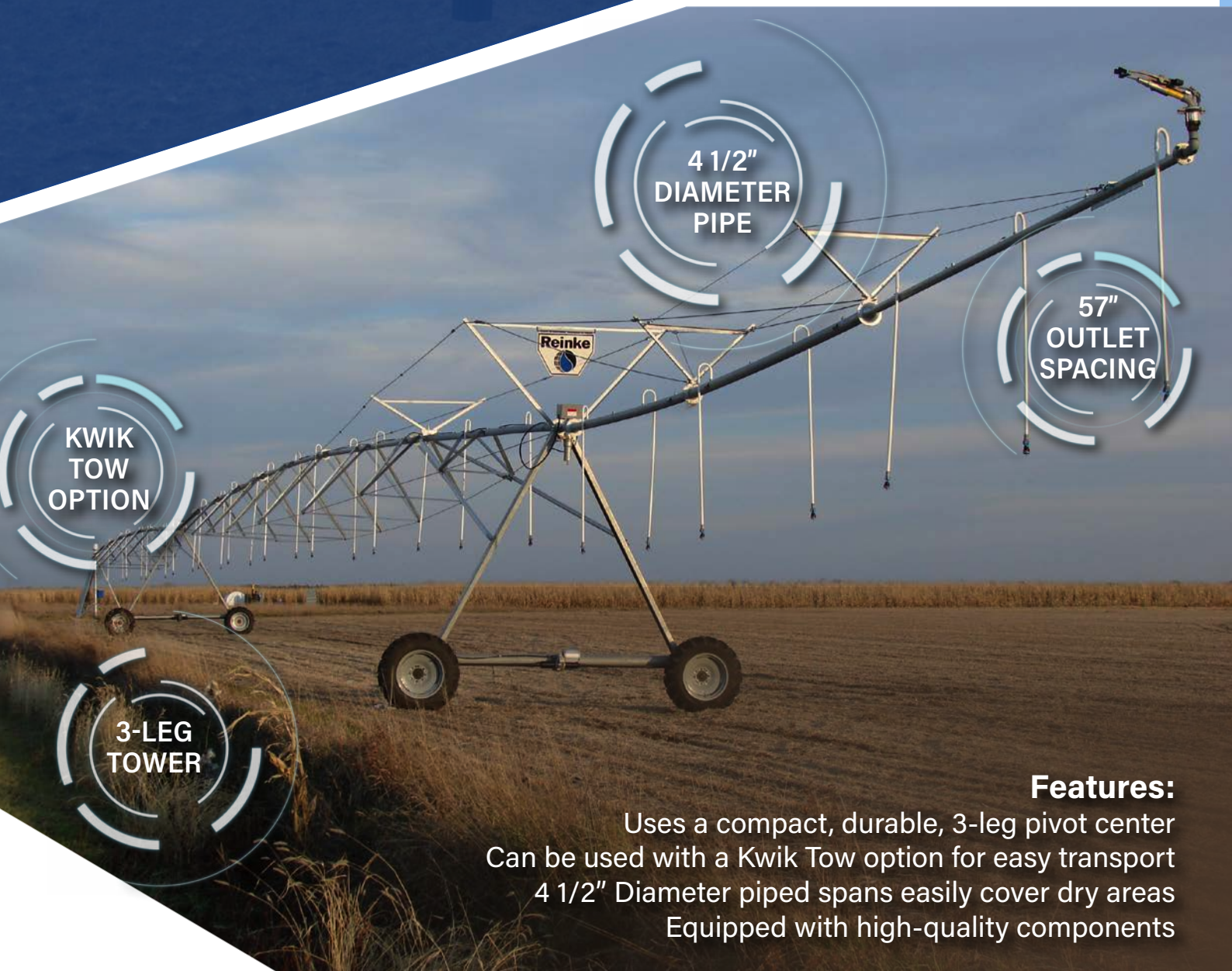


Feed and concentrate mixers can be manufactured either as a movable or fixed unit.

Treat your livestock and enhance performance. Talk to Jaco Pieters on (+27)82-335-3970 or landline (+27)23-342-6070. You may also send an e-mail to jaco@rumax.co.za.

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- Equipped with high-quality components

One of Jaco Strachan's eight Reinke pivots perfectly irrigating a sorghum field.



by Bianca Henning

Reinke's circles of success in

Pandamatenga, Botswana

Farming is a sheer pleasure in the Chobe district, south of the Zambezi River. It is safe and there is excellent support and help from the government to farmers, which ultimately provides them with several opportunities.

The vast majority of Botswana's grain sorghum (about 80%) is produced in the Pandamatenga district. It is a dream to farm in Pandamatenga! In January, we had the privilege of visiting a few farmers in this area to learn more about their farming operations and irrigation needs.

Not only did the farmers in Botswana show exponential growth the past two years, but Reinke irrigation as well. In this time Reinke has successfully installed 22 pivots for farmers in the area, irrigating a total of 376,5 ha of crops.

"When I look back from where we started two years ago in the area to where we are now, it is an honour for us at Reinke to see the circles of success not only on the farms, but the whole area," says Werner Wolvaardt, Business Development Manager of Reinke South Africa.

Most of the farmers in the area face challenges with the turf soil, therefore

farmers are compelled to choose the best and right farming equipment to eliminate downtime, and to take their businesses forward.

The main reason behind farmers choosing Reinke as their irrigation partner in this area, is the fact that Reinke's pivots do not get stuck in the turf. Everyone knows that time is crucial in any farming operation, and with Reinke's lighter yet stronger pivots, downtime is eliminated.

Our first visit was at Jac Johan van der Westhuizen. Jac is the proud owner of two movable 25 ha Reinke pivots, erected at the end of 2022.

Jac says: "Since we have contacted Reinke for the first time, the process was smooth, and it was really a pleasure to work with them. The pivots now enable me to cultivate crops throughout the year."

Our second visit was at Kallie Viljoen. Kallie has been a resident of the Pandamatenga district since 1997. His business, Eastford Holdings, was established in 2009. It is a beautiful spot with hectares of fields surrounded by baobab trees.

For Kallie there is no better sound than hearing the water from his pivots,

irrigating his crops. "We mainly grow grain sorghum, since it is the country's staple food, which we alternate with sunflowers, maize and beans. We also plant wheat and potatoes, of which 170 ha are under irrigation," Kallie explains.

Kallie owns two 30 ha Reinke pivots and one covering 7,5 ha. He erected his Reinke pivots in 2021.

Our third visit was at Panda Potatoes, where father and son Fred and Fred (junior) van Vuuren have a dynamic father and son relationship where they farm together north of Pandamatenga. They are well-known in the area for their potato production. They also plant maize and grain sorghum. They have been farming in this area since 1999.

"It is only by faith and grace that we are where we are today. Over the years, as our farm expanded, we also had to expand our irrigation. Farmers in the area already used Reinke pivots. We approached them, and we were very impressed with the strength of the pivots as well as the water application on the crops, and that is where our relationship with Reinke started," states Fred van Vuuren.

They started with one pivot, and

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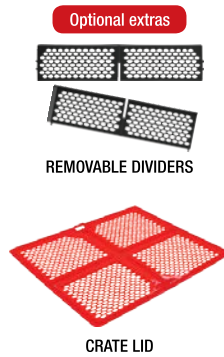
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Jac Johan van der Westhuizen with Werner Wolvaardt of Reinke on Jac Johan's farm with the beautiful landscape in the background.



Jac Johan's maize flourishing under his 25 ha Reinke pivot.



Kallie Viljoen and Werner Wolvaardt in Kallie's maize field.



For Kallie Viljoen, there is no better sight than water spraying from a Reinke pivot.



Werner Wolvaardt and Fred van Vuuren (junior) admiring the maize irrigated by Reinke.

today they have twelve pivots on the farm, of which nine are Reinke, irrigating 180 ha of crops.

Fred junior is the second generation taking over on the farm. "Being able to take over from my father and learning from him, is such a privilege, and being able to build up the farm for the next generations is a great honour," Fred junior says.

Our last stop was at a dynamic young farmer, Jaco Strachan of Winfort Investments, also situated in the Pandamatenga area. This is where Reinke's journey with the farmers in Pandamatenga began. They installed their very first pivot in the area here.

Three years ago, Jaco started with two 30 ha and two 15 ha pivots on his farm, and as the farm expanded, his irrigation needs also expanded to where he now has eight Reinke pivots, irrigating 115 ha of crops on his farm. There are no other pivots than Reinke on Jaco's farm.

"Because we harvest two times a year, there are times during the year when we face drought. I decided to start installing Reinke pivots on my farm after I did thorough research on several irrigation companies. In all aspects, Reinke rose above the rest," Jaco states.

Reinke is a well-known name in Botswana, and several farmers across the country have installed Reinke pivots on their farms.

Watermaster, the Reinke dealer in Botswana, provides excellent service to farmers across Botswana. Watermaster is situated in Francistown, and gets their stock from Reinke in South Africa.

"We are proud to be associated with our dealer, Watermaster, for the Botswana area. Ultimately, it is important for us that our farmers are happy and that the necessary products and services are available whenever they need it. Like our pivots, your Reinke dealer is in it for the long haul," Werner concludes.



Werner Wolvaardt and a satisfied Jaco Strachan at the Reinke control panel in his field.

Just like Watermaster, Reinke also walks the extra mile for farmers in Botswana. If you wish to get in touch with Watermaster Botswana, you can contact them on **(+267)-240-2620**, or send an e-mail to **watermasterbots@gmail.com**. For more information on Reinke's top class irrigation solutions and how they can assist you, find your nearest dealer at **<https://www.reinke.com/find-a-dealer.html>**.

Be sure to keep an eye on ProagriMedia and Reinke's YouTube channel and platforms to follow the full episodes of Reinke's circles of success in Botswana, and to listen to each farmer's informative story.



One of the seven Reinke pivots on Fred van Vuuren's farm, ensuring that the potatoes get sufficient water at all times.

THE NEW 6-CYLINDER ON THE BLOCK

Introducing the **John Deere 6140B CAB Tractor** as an addition to the current 6B model lineup.



This 103kW tractor offers specification and performance features that fully complement your needs in any application.

| **Heavy-Tillage** | **Planting** | **Spraying** | **Spreading** | **Mowing** | **Baling** | **Material Handling** | **Transport Work** |



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FOR MORE INFORMATION



JOHN DEERE

The new 6-Cylinder on the block: The John Deere 6140B CAB Tractor



Article supplied

The 6140B Cab Tractor is equipped with the proven John Deere 6-Cylinder Turbo Charged Tier III engine, incorporating the latest John Deere engine technology. This tractor boasts with 140Hp (103 kW) of rated power. The 6140B is the preferred answer to customer needs in grain, hay and forage, sugar cane, timber, and high-value crop production systems.

John Deere Africa Middle East recently introduced their 6140B Cab Tractor as an addition to the current 6B model line-up. All farmers can benefit from the versatility of this machine, especially those working in primary operations.

What makes the 6140B Cab Tractor different from the current 6B line-up?

To date, the 6B series was only available with a 4-cylinder, 4.5-liter engine. The new 6140B Cab model is the first to be equipped with a more powerful 6-cylinder engine, which incorporates an electronically controlled high-pressure common rail fuel injection system, intercooler, and heavy-duty PowerCore™ air filter system. Thus, optimised fuel efficiency, immediate torque response, and supreme engine reliability are all advantages of this state-of-the-art engine technology.

Moreover, this high-quality and well-balanced heavy-duty tractor can execute any application ranging from heavy tillage, planting, spraying, spreading, mowing, baling, and material handling to transport work, providing peace of mind for your farming operation. This machine can also accommodate implements such as rippers, speed discs, field cultivators, 8-row planters, and sprayers.

Transmission Options

Available in a Standard and Deluxe model, the 6140B Cab Tractor comes equipped with either a 12F/4R TSS 40 km/h transmission with a wet clutch; or a 24F/12R TSS 40 km/h transmission with Hi-Lo, PowerReverser™ and wet clutch. This allows customers to choose the tractor solution that best fits their farming needs.

Adding to the versatility offered by the two transmissions options, optimised performance and efficiency are further enhanced by the heavy-duty CAT II 3-point hitch with 5 400 kg hitch lift capacity, three SCVs with 200-bar open centre constant flow hydraulics, and a 540/100 rpm reversible PTO.

What more can you expect from the 6140B?

Tailored upgrades

The 6B's modern cab makes your working environment more pleasant and efficient. The new PowerReverser™



function combined with a tiltable and telescopic steering column, high-performance air conditioning and suspended seat, makes every minute in this Cab tractor an enjoyable experience.

Right balance and full flexibility

Correct weight distribution and flexible ballasting are essential for maximum power transfer and efficient working. The 6B dimensions, structural chassis, wheelbase, and ballasting flexibilities make this universal tractor series a trusted option for any job application.

Easy operation

The electrohydraulic PTO switch provides fingertip control for engagement and disengagement.

Power Reverser Efficiency

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Irrigation without irritation:

Senter360 pivots are ideal for farmers in Africa

by Benine Ackermann

Satisfied farmers in more than half of the African continent's countries depend on Senter360 for quality irrigation solutions.

Senter360's policy is to not only sell the best possible products, but rather offering a long-term solution to their customers with a mutual win-win attitude.

"Over the years we have built good relationships with our customers in Southern Africa," says Theuns Dreyer, Managing Director of Senter360. "We are excited about 2023, expecting even more growth. We also have an interesting addition to our product range to be introduced during 2023."

Senter360 products are designed to be exceptionally strong. "They are designed to survive in tougher than usual conditions in remote areas, keeping them running reliably for longer. It is also interesting to note that pivots sold in Africa are usually larger than those sold in South Africa," Theuns added.

A Senter360 pivot has a modular design throughout. This means a lower impact on the variety of spares required to build the machine, and therefore also to maintain it.



"The capital outlay for spares in remote areas is therefore smaller, making it easy to have a full range of spares ready in remote areas."

"We have many dealers and knowledgeable contact people across the continent to support our clients. We also gladly visit farms where and whenever required," he added.

Senter360 pivots are strong for farmers in Africa

"As mentioned before, our modular design with resulting advantages and outstanding structural falling strength of more than 2,5 times its own weight when filled with water, combined with its exceptional sideways stability withstanding winds above 158 km/h all add to its resistance to possible damage under extreme conditions. This is far more than any international competitor has to offer," Theuns added.

Their centre pivots are made in South Africa and tailored to their client's specific needs. "A pipe frame is used instead of the typical angle iron used for international centre pivots. With this method, we can increase the arc strength of our centre pivot while decreasing the wind resistance," Theuns explains.

Senter360 also has an internet based application for farmers to use. With an internet connection, the centre pivot can therefore be controlled from a distance from the farmer's phone, and the application can be used to track where the pivot is.

"Our modular design, combined with its exceptional sideways stability all add to its resistance to possible damage under extreme conditions."

Please do not hesitate to contact Theuns Dreyer directly for more information and local support: Call Senter360 at (+27)82-564-5955, or visit their website at www.senter360.co.za.



Sheep breeds part 4:

Learn more about sheep around the world

by Natasha Pansegrouw

The physical appearance of a sheep can be a significant factor in determining its overall characteristics. However, the breed's ability to achieve the highest levels of productivity and profit is the only factor that can account for the significance of this appearance.

Dorset

Dorsets are medium-sized, all-white sheep that can be horned or polled. They have desirable carcass qualities due to their good body length and muscle conformation. The fleece is extremely dense, tightly packed, and it does not contain any dark fibres at all.

Dorset ewes typically produce a fleece weighing between 2,25 and 4 kilogrammes with a yield of 50 to 70 percent. The length of a staple can range anywhere from 6 to 10 centimetres. It is anticipated that the diameter of the fibres will range from 33 to 27 microns.

The average weight of a mature Dorset ewe is between 68 and 90 kilo-

grammes; however, ewes that are in show condition can easily weigh more. The average weight of a Dorset ram is between 102 and 125 kilogrammes.

The Dorset is one of the few breeds that can breed "out of season," making it one of the more unique types of sheep. It is not uncommon to see multiple births, and the ewes are known to be excellent mothers and milk producers. Both in the ewe flock and in commercial settings, Dorsets can be useful in their capacity as terminal sires.

Corriedale

Both New Zealand and Australia contributed to the development of the Corriedale breed. After Leicester (long-wool) rams and Merino ewes were bred together, the Corriedale breed was developed through line breeding and thorough selection among the offspring of those animals.

The Corriedale sheep breed is valuable because it can be used to produce both wool and meat. It is polled and



Corriedale ewes with their lambs. (Source: nzfarmlife.co.nz)

has a high-quality carcass, in addition to having a large frame size. Although the historical purpose of the Corriedale has been to produce premium lambs when mated to sires of meat breeds, the breed is now achieving performance levels comparable to those of purebred lambs. This is because Corriedales are more genetically diverse than purebred lambs.

This benefit, along with the breed's high monetary value as a skin, makes it likely that the animal will continue to be a popular breed.

The wool produced by Corriedale sheep typically has a diameter ranging from 31,5 to 24,5 microns and is known for its high yield. The fleece of a mature ewe can be quite valuable; its weight can range anywhere from 4,5 to 7,7 kilogrammes, and its staple length can be anywhere from 9 to 15 centimetres.

The yield percentage of the fleece ranges between 50 and 60 percent. The typical adult ram weighs anywhere



Polled Dorset ewe with twin lambs. (Source: homefarmdulas.co.uk)



Three Corriedale rams with good stature. (Source: corriedale.org.au)

between 79 and 125 kilogrammes, whereas the typical adult ewe tips the scales between 59 and 81 kilogrammes.

Lincoln

The mature weight range of Lincoln rams is between 113 and 160 kilogrammes, while the mature weight range for ewes is between 90 and 113 kilogrammes. Lincolns have a form that is somewhat rectangular, a deep body, and show a great deal of width. They have a back that is straight and strong, and their wool is thick. They frequently lack fullness through the leg and have the appearance of being somewhat upright when their fleece is short.

The Lincoln's fleece is carried in thick locks that are frequently twisted into a spiral toward the end. Lincolns should have dense wool growth up to their knees and hocks; however, it is not uncommon for certain individuals to have wool growth below these points.

The staple length of Lincolns is among the longest of all the breeds, ranging from 20 to 38 centimetres, and the yield can be anywhere from 65 to 80 percent. Lincolns are bred to produce good quality wool. Lambs, and even sometimes older sheep, will have a part of their fleece running over their back. Lincoln ewe fleeces can weigh anywhere from 5 to 9 kilogrammes, making their wool the coarsest and heaviest of all long-wooled sheep varieties. The fibre diameter of the fleece can be anywhere between 41 and 33,5 microns, and its numeric count ranges from 36 to 46. The lustre of the fleece



Lincoln ewe with her lamb. (Source: thelincolnite.co.uk)



The Lincoln ram has a fleece that is covered in thick locks. (Source: lincolnlngwools.co.uk)



A Hampshire ram with a lot of muscle. (Source: farminglife.com)

is quite impressive, even though it is coarse and has a hair-like appearance.

The Lincoln has a large carcass that is lean and well-muscled throughout. The prolificacy of the Lincoln is about average. Since mature ewes are easy feeders, they can sometimes become overconditioned, and as a result, they do not breed as frequently as breeds that have a lower aptitude to take on fat.

Lincolns are hearty eaters that can make excellent use of a plentiful supply of high-quality roughage or pasture. Lincolns are bred in the United States. The Lincoln should have clear white colour markings, and its head should be larger and more pronounced than the heads of other long-wooled breeds.

The breed is characterised by the presence of a forelock that sits in the space between the ears; when allowed to develop naturally, this forelock is relatively subtle.

Hampshire

The Hampshire Standards were developed to focus primarily on the characteristics that researchers have identified as contributing to a higher level of productivity in individuals. The characteristics of multiple births, weight relative to age, face covering, refinement about the head and shoulders, muscling, and freedom from unsoundness are given a significant amount of weight in the selection process. Two of the most notable things about Hampshires are how fast they grow and how well they use the food they eat.

The Hampshire is a breed of sheep that is known for its gentle temperament, large size, and open face. To be considered mature, rams should weigh at least 125 kilogrammes and ewes should weigh at least 90 kilogrammes when they are mature adults. The ears should be of average length, fairly thick, covered with coarse hair that is either

dark brown or black, and free of wool.

The face should be a decent length, have a dark colour, and be nearly devoid of wool from the eyes down. A continuous woolcap should be seen that extends from the neck to the top of the head. Wool should be kept to a minimum on the lower part of the legs, between the knee and the hock.

The Hampshire should have quality without any signs of weakness and size without any signs of being rough.

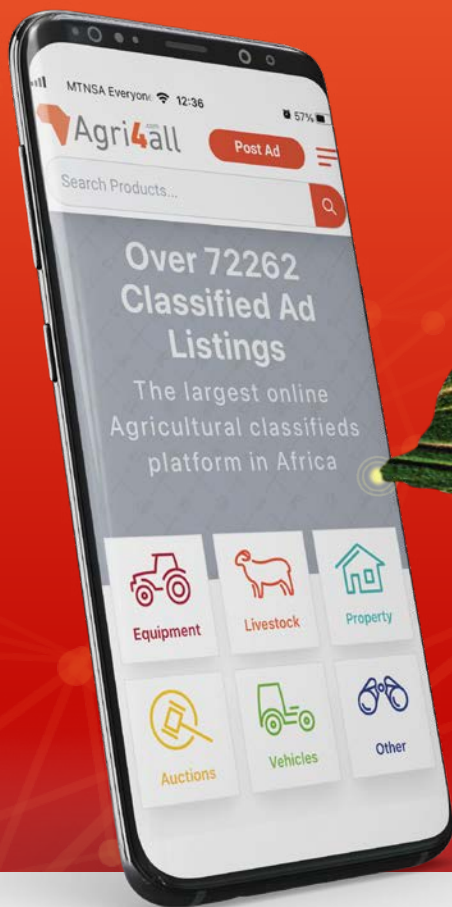
A mature ewe's fleece weighs between 2,7 and 4,5 kilogrammes, has a micron measurement of 25 to 33, and a spinning count of 46 to 58. The staple length of the fleece will range from 5 to 9 centimetres, and the yield percentage will be between 50 and 62 percent.



Hampshire ewes along with their lambs. (Source: ardenandaspley-flocks.com)

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Varroa mites inside a cell rob the larva of nutrition.

Beekeeping part 7!



Varroa destructor mite is the most serious parasite of honeybees.

by Tisha Steyn

Pests and diseases

Bees are subject to pests and diseases, and beekeepers should be on the lookout for symptoms. In many countries beekeepers are required to register with the relevante authorities and in South Africa, all beekeepers are required to register with the Department of Agriculture and report any diseases to prevent spreading to other colonies. Since it is difficult to enforce this law, especially among numerous unregistered beekeepers, diseases can spread and cause havoc in the bee industry.

Being knowledgeable about honeybee pests and diseases is important for keeping healthy swarms and good quality bee products. Early detection and suitable action will ensure sustainable hives.

American foulbrood

American foulbrood (AFB) is highly contagious and is caused by a bacterial

infection inflicted by *Paenibacillus* larvae. It causes severe losses for beekeepers and is extremely difficult to eradicate.

Infected colonies have uneven brood patterns with dark, sticky, and sunken cappings. It also has a ropiness when a stick or match is inserted in the cell and drawn out. The dead larvae smell foul.

There is no alternative but to burn the hives to get rid of the infection. This is a reportable disease, and the Department of Agriculture should immediately be informed if an infection is suspected.

Specific regulations exist for the removal and destruction of colonies infected with a notifiable disease. Refer to the Government Gazette under References.

European foulbrood

European foulbrood (EFB) is a common bee disease in South Africa. Although it is found throughout the country, it is more prevalent in humid areas, like KwaZulu-Natal, especially when the hive is under stress.

It is caused by the bacterium *Melissococcus pluton*, which is ingested by young larvae of about four to five days old through the food they are fed. The

larvae multiply in the bee's intestines, robbing the bee of its nutrition, and the bee dies of starvation even before the cells are capped. The remains of dead larvae cause more infection.

Look out for dead or dying larvae that are curled upwards, yellow or brown in colour, seemingly melted to the sides of the cells, or dried out and rubbery.

As soon as any stress is relieved and more worker bees and food forage become available, the infection and the symptoms may disappear, and the larvae can survive. A weak hive can be combined with a healthy, uncontaminated swarm with a laying queen to boost its chances of recovery.

Chalkbrood

The occurrence of chalkbrood, caused by the fungus *Ascosphaera apis*, has dramatically increased since the discovery of the parasitic varroa mite.

The fungus causes chalkbrood, which only attacks larvae. Ingested spores germinate and mycelia grow through the body, penetrating the epidermis and quickly covering the pre-pupa, which dies because of physical damage and because the fungus extracts nutrients.

The pre-pupa dries out to form a



Varroa mites cause malformation and weakening of honeybees.

Small- and large hive beetles may enter the hive.

chalky lump, or mummy, which fits loosely in the cells and can be removed by the bees. They cast the 'popped rice' mummies out, which alerts the beekeeper of the disease.

Nosema

Nosema is caused by *Nosema apis*, which affects adult bees' nutrient absorption and gut. This leads to less brood food being produced and can lead to 15% fewer larvae production.

Symptoms of heavily infected colonies include clumsy and lethargic bees with swollen abdomens and brown diarrhoea.

Although it occurs countrywide, it has not been linked to colony deaths.

Varroa destructor

The tiny red-brown, external Varroa destructor mite is the most serious parasite of honeybees, as it causes malformation and weakening of honeybees. As a result, adult bees are crippled and start crawling; they can not fly properly.

The disease has spread from its natural host, the Eastern honeybee (*Apis cerana*) to the Western honeybee (*Apis mellifera*).

Varroa mites attack adult honeybees and larvae, especially drone larvae.



Carmine bee-eaters are among a number of birds that feed on bees.

Colonies infested with a lot of them also have problems with other bee diseases and pests, including small hive beetles, chalkbrood and *Braula coeca* (wingless fly).

These mites cause poor brood patterns and scattered brood, with sunken and chewed cappings and with the larvae collapsed in the bottom or against the side of the cell.

Tracheal mites

Acarine disease in bees is caused by the tiny tracheal mite, *Acarapis woodi*, which pierces the bee's windpipe or trachea and feeds on the bee's 'blood'. These mites occur throughout South Africa.

There are no reliable symptoms of infestation as they can only be detected under a microscope and are like that of Nosema. They may cause disjointed wings, so bees cannot fly but crawl on the ground near the hive.

Wax moth

The larvae of the wax moth (*Galleria mellonella*) leave a mass of silk trails and can destroy the entire comb, but strong colonies may be able to control the moth population. Infestation by wax moths is less likely to occur in hives at higher altitudes where it is colder. The wax moth is problematic when storing empty boxes without bees.

Sacbrood

Sacbrood virus (SBV) is a well-known viral bee disease with recognisable symptoms.

The larva's outer layer fills with a clear liquid, while the underdeveloped head darkens. Sacbrood can also be recognised by an uneven brood pattern with sunken, discoloured, and perforated cappings with jagged edges.

Bee paralysis

Paralysis of adult honeybees, which results in the inability to fly and uncoordinated trembling of the body, is commonly caused by viruses. These include the chronic bee paralysis virus (CBPV), acute bee paralysis virus (ABPV) and the Kashmir bee virus (KBV), which is like ABPV.

The symptoms of paralysis are the same as with Nosema and pesticide poisoning. Affected bees are usually found on top of the frames but in severe cases, the crawling bees are seen on the hive floor and in front of the hive, and death follows within a few days.

Others

Other pests that are more of a nuisance than an economic threat to your hives include the small- and large hive beetle, banded- and yellow bee pirates, wasps, the deaths head moth and lesser- and greater wax moth, parasitic flies and nectar flies, and other parasitic mites.

Rodents, toads, geckos and lizards, termites, ants, bee scorpions, the braula bee louse, birds, baboons, and honey badgers can all take their toll. And those are in addition to starvation, overheating and chilling of the bees!

This is a summary of the most important diseases and pests, but it is by no means complete and it is a good idea to read more on the subject. The resources mentioned at the end of the article are a good starting point.

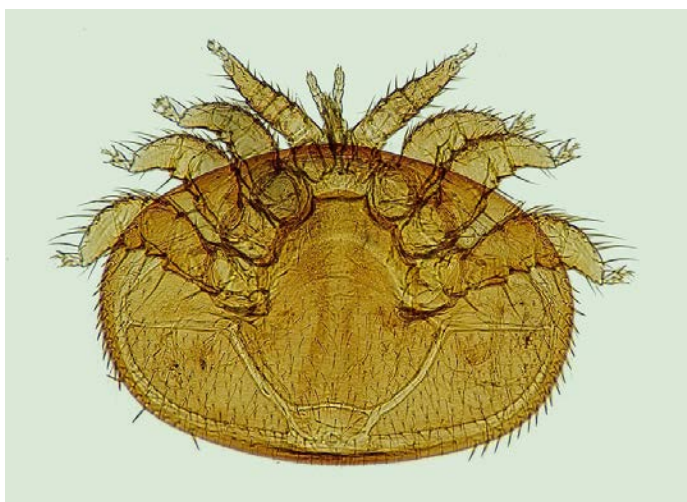
It is also advisable to join your local beekeeping association and learn from experienced beekeepers. You can also join a Facebook group where fellow beekeepers share their experiences and information.



Varroa mites feeding on a larva.



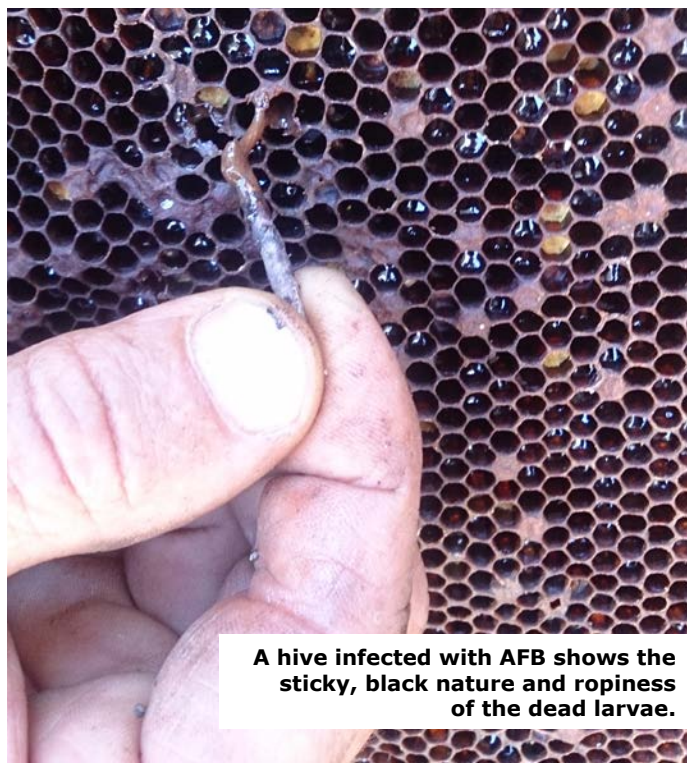
Varroa mites inside the cells.



Close-up of a varroa mite.



These hives on stands may defy badgers, but not a wild-fire.



A hive infected with AFB shows the sticky, black nature and ropiness of the dead larvae.

Contact Mike Allsopp at allsoppm@arc.agric.za

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Processing of condiments

Part 26:

PEAR RELISH

A relish is a sweet-n-sour condiment containing preserved fruit/vegetable pieces and spices. It is served with curries, hot and cold meats, and savouries.

Pear relish is usually prepared from firm mature or green pears.

A basic formulation is as follows:
100 parts vinegar; 250 parts chopped pears; 42 parts chopped onion; 2 to 30 parts chopped chilli peppers; 50 parts chopped green peppers; 50 parts sugar; 4 parts dry mustard; 2 parts allspice; 1 part cinnamon; 1 part cloves; 1 part turmeric; 1 part salt.

1. Harvesting

Pears are one of the few fruits that are harvested in the mature green stage for processing. Harvesting is primarily done manually. Since pears do not have a definite maturation pattern, each tree may require to be visited several times during the harvesting period. Maturation can be hastened and the time of harvesting shortened by spraying the trees with chemicals.

2. Separation and sorting

This is done to select the best suitable raw materials for manufacturing the value-added end product. The pears

are sorted by hand to remove over-mature and damaged fruits. Unwanted materials such as trash, plant rests, sticks, *et cetera*, are also separated.

3. Washing of pears prior to processing

Washing is necessary to remove dust, contaminants and residual chemicals adhering to the fruit. The pears are washed with potable water that is sprayed over the fruit while being transported on a conveyor belt. The water may be chlorinated (1 to 2 ppm). Soft rotating brushes usually accompany the water sprays to provide more effective cleaning without damaging the fruit.

4. Inspection and grading of pears

The pears are inspected to ensure that only sound fruit are processed. Size grading is performed with diverging rope or belt sorters to create uniform batches for mechanical peeling and coring machines.

5. Coring and peeling of pears

Pears can be automatically cored and peeled in one operation. The pears

are aligned and orientated to ensure the correct position for the device that performs coring and peeling by the spinning action of special knives and rotating tables. The peeled and cored pears are usually halved or cut into smaller pieces by rotating blades prior to further processing.

6. Trimming and cutting the pears for relish

The pear pieces are inspected for any minor defects that may be trimmed away. The pear halves are usually reduced in size and cut in smaller pieces of more or less the same size.

7. Boiling of ingredients

All the ingredients are combined in a large saucepan or batch cooker and allowed to boil for 12 to 18 minutes until the pears are tender (not soft).

8. Packaging

Packaging is defined as the containment of a food product in a protective barrier that prepares goods for transport, distribution, storage, retailing, and end-use. The relish is filled into suitable containers at a temperature of 85 to 95 °C.

This requires the boiling relish to be slightly cooled in horizontal mixers fitted with water jackets prior to filling. Suitable containers are commonly glass jars with lacquered metal screw-on tops. Glass jars used for the preservation of food should be of high quality, without any cracks or chips, and should form tight seals. The bottles require proper cleaning and heating prior to filling to avoid cracking (thermal shock) due to the high temperature of the relish.

Rotary fillers or multiple-piston displacement machines capable of filling between 100 and 600 jars per minute are used in large-scale operations. The jars are sealed immediately after filling



Pear harvesting. (Image Source: munchiemusings.net)



Source: Pixabay

using a steam-flow machine to ensure air exhaustion and the formation of a vacuum in the cooled, sealed product.

9. Cooling

Cooling involves extracting heat from the product to decrease its temperature using an appropriate device such as a heat exchanger and a medium, for example water, air or refrigerant. The filled and sealed containers of hot relish are allowed to cool naturally for 10 to 15 minutes, ensuring pasteurisation of all interior surfaces. Further cooling to below 40 °C may be accelerated by water-cooling. This in turn requires drying prior to labelling.

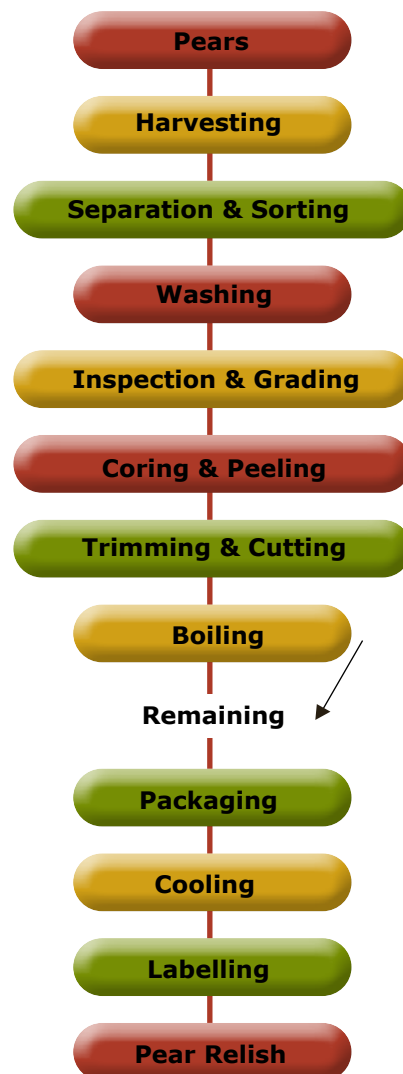


Source: Pixabay



Pear relish. (Image Source: creativecountrylife.com)

Process description



Source: Pixabay

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Boost your profits with better pastures



Botswana is home to more cattle than people. In recent years, the government has made an effort to encourage crop farming in order to boost the national economy. Many farms are being set up, particularly in the northern regions, and many irrigation projects are launched. These irrigated farms are mainly focussed on the cultivation of various grain products and some other crops such as potatoes.

But they can also be used to supply feed to cattle farmers or be successfully operated as cattle farms with irrigated pastures. Good pastures will improve the condition of your herd and save you money by cutting the spending on expensive feed. Farmers usually have two choices of pastures for their cattle. The first is to let the animals graze on the natural pastures that are available on the farm, and the second is to plant specific grasses and legumes that can increase the carrying capacity of your farm.

Good management is key to success of your pastures. Certain guidelines need to be followed. Which plants to choose from, when to plant them, the type and quantity of fertiliser that you use, whether you have irrigated or dry lands ... all these factors play a role in the type of pasture that will best suit your needs.

Whether you plant other crops or pastures, it is always beneficial to have irrigation. However, it does not mean that you cannot plant if you do not have an irrigation system already in place. In the modern age of farming there are many drought resistant cultivars.

Winter is fast approaching in the southern hemisphere. This is the dry season for summer rainfall areas of Southern Africa, when natural fields dry out and are easily overgrazed. The shortage of food and water is the cattle farmer's worst nightmare. Luckily, there are some options to choose from

when it comes to winter pastures. The following crops can be planted from February to July in order to ensure good quality pastures to carry you through the dry season. It is recommended that these species are planted under irrigation for winter pastures.



Tall fescue grass is also known as fescue reed and it is an excellent choice for winter pastures due to its high nutrient content and ability to survive cold conditions. It is also versatile and adapts well to various climates and soils. (Source: Alchetron)

Tall fescue (*Festuca arundinacea*)

Tall fescue grass is highly adaptable to different climatic and soil conditions. It can also be used in heavier soils and wetlands. It is recommended that these seeds are sown at a ratio of 25 to 30 kg/ha or planted in rows at 20 to 25 kg/ha.

Cocksfoot (*Dactylis glomerata*)

Cocksfoot grass has high nutritional value, and animals find this type of grass very tasty. It is resistant to drought and can be sown at a ratio of

20 to 25 kg/ha or planted in rows using 15 to 20 kg/ha.

White clover (*Trifolium repens*) and red clover (*Trifolium pratense*)

These two types of clovers are usually planted together. The white clover takes longer to reach maturity, but does not have to be replanted every year. Both of these can be used in combination with any of the abovementioned grasses to increase the nutrient value of the pasture.

In many cases, farmers solely depend on rain and do not have access to the benefits of irrigation systems, or they might be small-scale farmers who believe it is not worth the cost and effort to install irrigation systems and therefore rely on the natural vegetation.

Fortunately, even dryland or small-scale farmers can benefit from planting pastures for their animals. Dryland grasses need to be planted earlier than irrigated grasses in order to receive the late rains before the start of the dry winter. Ideally, they should be planted between February and April in order to be mature enough to be grazed by May or June.

It is often recommended that farmers plant a combination of pasture plants in order to obtain the best feeding value from the fields. The combination of the right plant species



can increase the quality of the feed significantly and maintain good animal health throughout the winter.

Oats (*Avena sativa*)

Oats provides good nutrients and roughage to cattle, and is also very hardened against drought and frost. It is recommended to sow oats at 50 to 70 kg/ha or plant it in rows at 40 to 50 kg/ha. It also has an exceptionally high potential yield.

Triticale (*Tritico secale*)

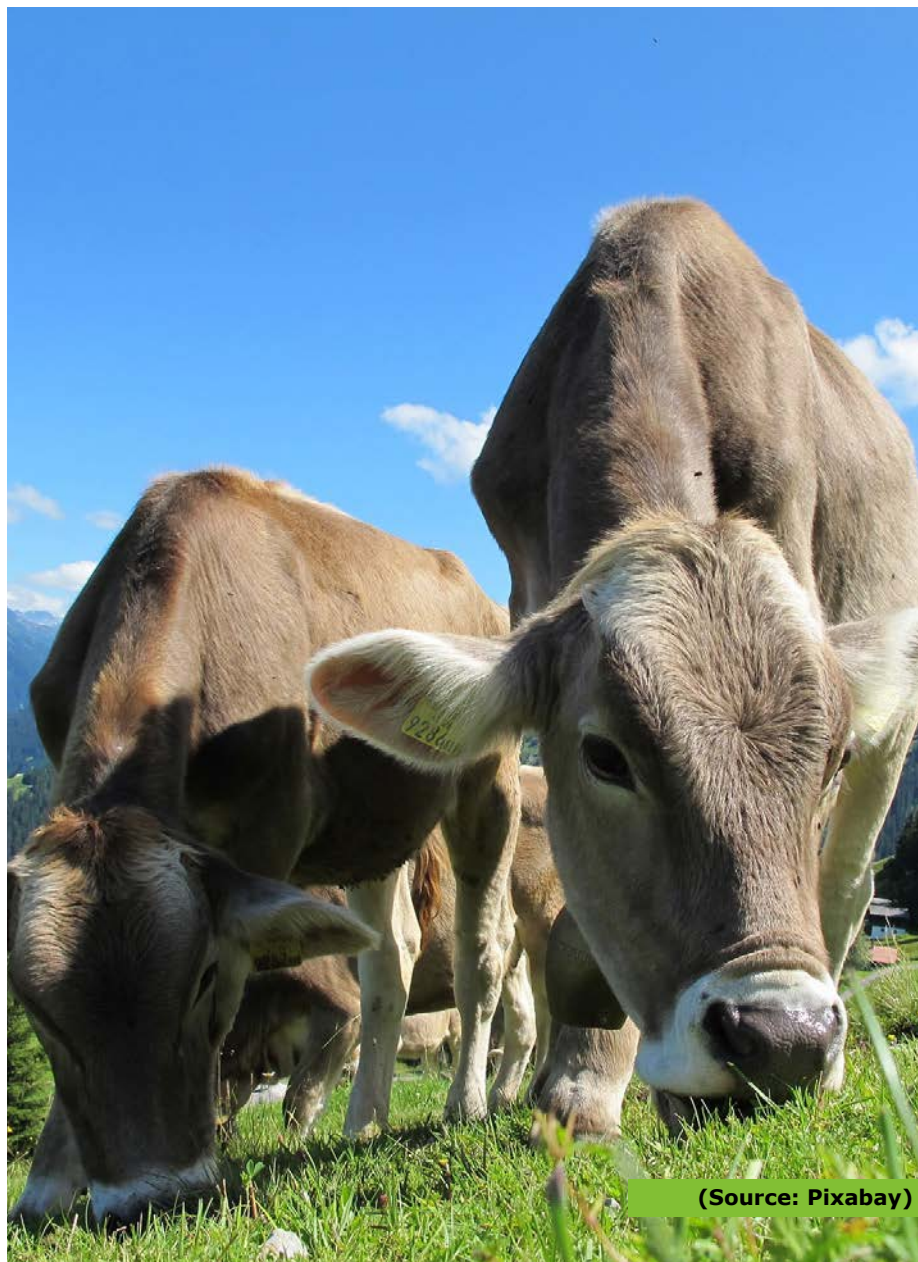
Triticale can withstand low temperatures and frost, and grows quickly with minimal water. It also has a high potential yield and grows easily. It is most effective when planted in combination with oats. It can be sown at 60 to 80 kg/ha or planted in rows using only 35 to 45 kg/ha.

Rye (*Secale cereale*)

Rye is best utilised when planted in combination with triticale and oats. It has a high nutrient value but is not as tasty as the other winter feeds. Between 40 to 50 kg/ha can be sown on the fields, or it can be planted in rows using only 30 to 50 kg/ha. It is hardened against cold conditions and can withstand the effects of frost.

Although these plants can increase the carrying capacity of your farm, you still need to consider the number of animals that will graze on these pastures, and plant accordingly. It is a good idea to keep in mind that cattle will consume about 2,5% to 3,5% of their own body weight in roughage per day.

The best advice would be to consult the experts. Most seed providers will help you plan the correct combination of plants to meet your specific needs. It is important to consider the existing carrying capacity of the farm, the number of animals that need to graze on the pastures and the availability of water when planning your winning pastures.



(Source: Pixabay)



(Source: Pixabay)

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Spice and herb production:

The origin & history of spice in Africa

by Maryna Steyn

The discovery of spices and herbs, in particular the trade of these ingredients, was a defining moment in world history. Firstly, because spices and herbs enhanced the culinary experience, and secondly, it was the start of a global economy.

In ancient times, spices and herbs were important commodities. Perfumes made from the aromatic plants adorned the bodies of the wealthy and kings. Often, spices were used as a form of currency or exchange, making them just as valuable as gold.

Ancient Egyptians used caraway, coriander, fennel, garlic, mint, peppermint, and poppy for many different medicinal applications and treatments. Some of these include the embalming of deceased individuals for mummification. Cardamom and cinnamon from Ethiopia were also a delicacy that spiced up their diets.

During Biblical times, the importance of spice was documented. Salt, for

instance, is a vital part of ensuring a dish does not taste bland. Other spices were used as a fragrant skin treatment and perfume, or oils extracted from the plants were used for religious practices such as anointings.

Spice (used here as a collective for both spice and herbs) was strongly positioned as an important commodity in the Middle-East by the Age of Exploration and it made its way to the west through the Silk Road. Merchants who travelled through Middle-Eastern countries towards Europe brought with them beautiful silk garments and spices from the East.

But this way of trade was costly to the people in the West, because most

Source: Pexels



Herbs, the leaves of aromatic plants, were also traded as spices. This collection of compounds changed cuisine forever. (Source: Alleksana on pexels)



Herbs contain many medicinal and nutritional benefits. (Source: Pixabay)

often they needed to purchase the aromatics from the Arabs, not directly from the countries the spices originated from. Needing to travel across many countries on the silk road meant a strenuous journey that was filled with danger and politics driven by the desire of many leaders to have the spices for themselves.

European kings and rulers started to investigate other avenues of obtaining the substances without needing to rely on all the middlemen. Thus began the Age of Exploration. This era was marked by many voyages by European explorers in attempts to find an alternative route to the East-Indies. One of the explorers was Vasco da Gama from Portugal who eventually succeeded in rounding the tip of Africa.

During his journeys along the coast of Africa, Da Gama learnt many things. While he stopped over in Kenya, he saw both the spices and the Indian merchants who brought the aromatics with them. This was proof that the spice trade in Africa was already alive and well. He continued his expeditions around the coast of Africa and finally made it to India after years of trying.

The spice trade route around Africa was born.

As the demand for spices and herbs grew in Europe, Asia could not keep up with supply.

Portugal gained control of the African spice route through the annexation of Tanzania, which included Zanzibar at the time. The area's tropical climate, rich soil and access to a trade route made it the ideal place for cultivating the aromatics, mainly nutmeg, pepper, ginger, and cloves. Many of the spice crops were planted on the slopes of the Eastern Arc, a mountain range close to the coast of Tanzania.

By the 19th century, Zanzibar was the leading exporter of spice.

Further migration of East-African and middle-Eastern inhabitants deeper to the west, as well as the exploitation of these countries by the West lead to the introduction of more plants used for spice and herb production. Cultivation, although not very well documented, followed throughout Africa. Plants from around the globe, from Asia, the middle-east, and even South America, were brought to the continent.

Omani Arabs began spice farming



Spices have been a sought-after flavour enhancer since antiquity. (Source: Pexels)

in Eastern Africa. Today, their heritage remains in the delicious dishes of eastern African cuisine.

It is important to note that the impact spices had in Europe, and Africa for that matter, was more than just a flavour enhancer for food. It became a



A Renaissance painting of Vasco da Gama in the Museu Nacional de Arte Antiga in Portugal. (Source: Wiki-commons)



useful addition to medicines and many of the plants are still praised for their medicinal qualities today.

Some such as cinnamon is antibacterial, anti-inflammatory, and anti-



Spices in containers at an African market. (Source: Pixabay)

icrobial. Black pepper can soothe indigestion and sage can prevent wounds from becoming septic.

Beyond the health benefits of the spices, the plants have a variety of nutritional benefits. Consumers therefore also added micronutrients to their diets when consuming these ingredients.

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African agribusiness companies can still grow – Part 3

Factors affecting agribusinesses cannot be looked at from one perspective, especially for Africa. Each Sub-Saharan region is facing unique challenges in its environmental, socio-political, and economic systems. Once these challenges are met head-on with sustainable and maintainable solutions, only then can the growth of agribusinesses be stable.

Success of an agribusiness differs from place to place, also depending on the stage in which the agribusiness is operating.

Environmental factors

Among environmental or natural elements affecting the Sub-Saharan region are factors such as climate, soil, and topography.

Areas deficient in heat are deficient in agriculture. Temperature determines the growth of vegetation through determining the length of the vegetative period.

According to Chand, successful agriculture requires a fairly long summer.

In higher latitudes, however, the shortness of summer is compensated by the longer duration of the day. The total amount of heat received is enough for ripening of crops. In lower latitudes where the winters are never too cold to arrest the growth of vegetation, practically the whole year is the growing period, and the agricultural operations are timed according to rainfall.

The moisture requirements of the plant vary according to the heat received. In the higher latitudes, where the summers are not very hot or where the winds are not dry, the amount of moisture given out by plant transpiration is less than in the lower latitudes where the heat received is great and the capacity of the winds to suck up moisture considerable.

Several countries face drought, flooding, and other adverse weather conditions not favourable for production, which results in low quality post-harvest processing and low profits along the agricultural value chain.

Poor soil quality results in little or no

production at all. For the production to be successful, extra investment must be made to alter the soil quality organically or inorganically by using chemicals.

Topography affects agriculture as it relates to soil erosion, difficulty of tillage and poor transportation facilities. Mechanisation of agriculture depends entirely on the topography of land. On rough, hilly lands, the use of agricultural machinery is impossible. Whatever the challenge, there is a physical change that can be made to the land.

Socio-political factors

On the social front, elements such as regional social structure, tribal cultures and social norms still affect agriculture, especially in Sub-Saharan Africa.

A region's social structure can determine the type of farming that will be practised, for example if the main production will be done by shifting cultivation, subsistence farming, extensive cereal cultivation, or mixed farming. For example, several regions



Photo: www.ttro.com/wp-content/uploads/2018/02/TB032-From-Seed-to-Market.jpg

in Zambia still involve themselves with only small-scale maize production as it was the predominant farming system.

Another way in which social factors can affect agriculture is in the ownership and inheritance of land. Some land is ruled by chieftaincy which generates challenges when it comes to title deeds possession as not all land ministries acknowledge that chieftain land is worthy of the documents.

Tribal cultures can determine the dominating gender within agriculture, as some cultures are not supportive of females playing an active role in agriculture. In some countries it may even go as far as gender determining if one can assess a loan or even agricultural services from experts.

Family social structures also have an influence. Inwood (1999) states that multi-generation farmers (MG) and first-generation farmers (FG), that is farmers who do not come from a farming family; are two sub-groups of farmers that embody different motivations for farming. (The term FG is distinct from "Beginning Farmer" which is defined by the US Department of Agriculture (USDA) as an individual farming 10 years or less.)

On the surface, MG and FG farmers demonstrate similar economic motivations for achieving and maintaining a livelihood, however, each group embodies a distinct set of economic and non-economic values that underlay the strategies MG and FG farmers use to structure their farm operations.

Quite a number of Sub-Saharan Africa commercial farmers are still FG, a *status quo* affecting the efficiency and effectiveness of farm management.

On the political front, government policies regarding land, irrigation, marketing, and trade, have a direct impact on agriculture. Regulatory measures affect subsidies, loan policy, purchase policies, agricultural marketing, international trade, and tax policy. Every participant in the agribusiness value chain is influenced.

The regulatory measures are also determined by the overall political operating system. The political system, which can be capitalistic, communist, or socialistic, determines the pattern of agricultural functionality as it will promote structures that correspond with the system to be upheld.

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Bacteria have a right to life: The importance of preserving the lives of beneficial microorganisms

Bacteria can break down pollutants and enhance soil fertility. In bioremediation research conducted by the Microbiology and Environmental Biotechnology Research Group at the Agricultural Research Council (ARC-Soil, Climate, and Water), bacteria and fungi possessing these abilities were isolated and identified.

There are also microorganisms that are able to associate with plant roots in a mutually beneficial manner.

We need all the help we can get to reclaim infertile agricultural land, because land is a limited natural resource. These tiny life forms can assist, but also need our protection to do their jobs.

Microorganisms are those life forms considered too small to be perceived by the naked eye, but can be seen through a microscope. One of their well-known characteristics is that they are found everywhere – in the air, soil and water, and within or on the surface of other living beings.

Amongst all microorganisms, bacteria are the most prominent. Some bacteria are considered to be good, others bad, and some in between. The good ones are known for various functions in human health, food processing, pharmaceuticals, and agricultural uses. The bad bacteria are those known to cause diseases and infections in humans, animals and plants.

It is now common knowledge that the harmless and beneficial bacteria far outweigh the detrimental ones.

Considering bacteria in soil, the beneficial bacteria are known for functions such as promoting plant growth, increasing soil fertility by mobilising nutrients and warding off plant diseases. This group of beneficial bacteria is referred to as plant growth promoting bacteria.

Furthermore, some beneficial bacteria are also known to aid mycorrhizal formation within plant roots; these are the mycorrhizal helper bacteria. Mycorrhizal associations are formed in many host plants by obligately or facultatively symbiotic fungi.

Obligate symbiotic fungi would only complete their life cycle and be functional while in a relationship with the host, whereas facultative symbiotic fungi would be functional with or without the host.

Mycorrhizal associations are important in various ecosystem functions, such as initial plant colonisation on

land, forest establishment and maintenance, reclamation and rehabilitation of previously polluted land and are also used as bioinoculants to improve agricultural output.

Another group of beneficial bacteria in soil is the rhizobia, which are soil bacteria that are prominent in the biological nitrogen fixation process within nodules of some leguminous plants.

Performing these positive roles, the life of such beneficial microorganisms should be considered very special and therefore safeguarded.

Any form of encroachment or anomaly such as pollution, degradation and even tillage of the soil, directly and indirectly impacts negatively on soil bacteria. Soil pollution destroys a great number of harmless and beneficial bac-

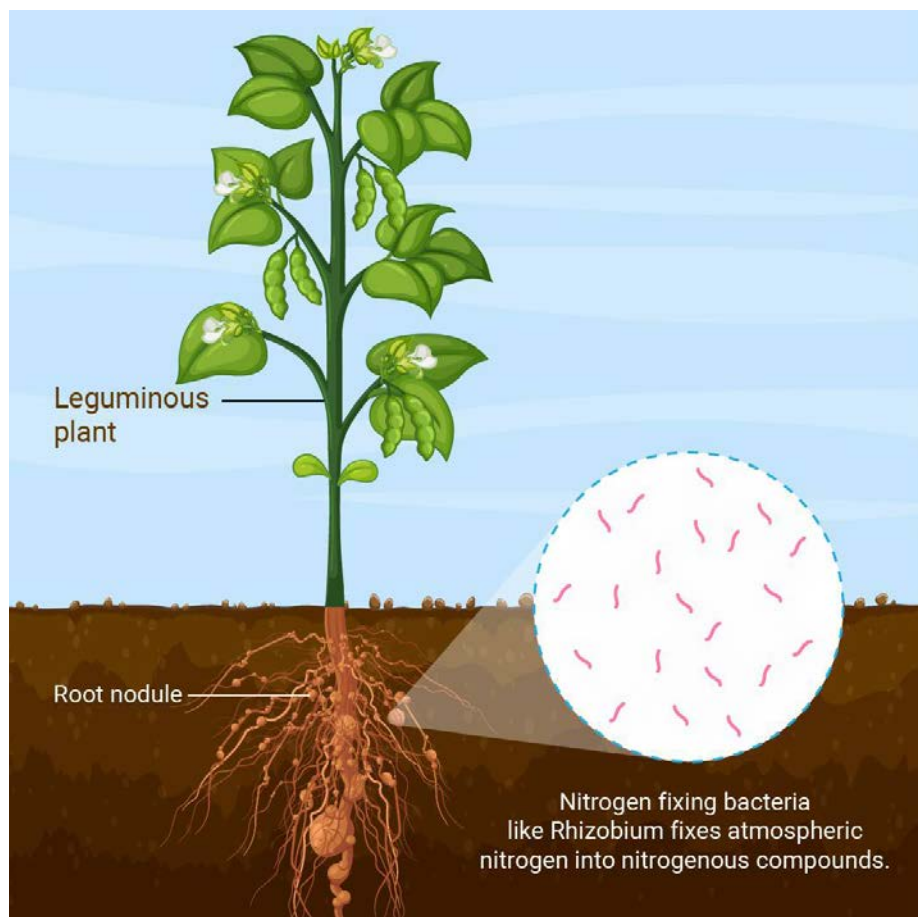
teria, with serious repercussions on the functionality of the soil.

Indirectly, the presence of certain pollutants (such as electronic waste) could trigger antibiotic resistance in soil bacteria, thus making them more virulent.

From the angle of sanctity of life, activities negatively impacting microbial lives are clear cases of violation of the life of soil bacteria and are obvious injustices to microorganisms in general. The right to life and protection of beneficial bacteria should be advocated in the same way it exists for other life forms.

Something must be done to protect bacteria from the adverse effects of soil pollution.

Pollution puts our soils in danger, with



Rhizobium is a nitrogen-fixing soil bacteria. It lives in the root nodules of leguminous plants. It has a symbiotic relationship with the plant. It fixes nitrogen for the plants to absorb, in turn, consumes the food produced by the plant. Here, both the partners are benefited.



By their activity in the soil, earthworms offer many benefits: increased nutrient availability, better drainage, and a more stable soil structure, all of which help improve farm productivity.

the implied threat of them becoming incapable of meeting human needs. Soil is able to provide its various ecosystem services, because it is a living system comprising different microorganisms (bacteria, fungi, protozoans, and viruses), insects, earthworms, nematodes, and arthropods. Soil provides a habitat for all these organisms and is the basis

of the terrestrial agro-ecosystem from which we derive feed, fibre, and fuel.

In fact, soil is the medium that human survival hinges on. As long as soils are at risk and the good soil bacteria are eliminated, sustainable agriculture, food security, and the provision of ecosystem functions will be compromised.

This article was published in acknowledgement of the Microbiology and Environmental Biotechnology Research Group at ARC-SCW.

The Microbiology and Environmental Biotechnology Research Group at ARC-SCW utilises both fundamental as well as applied microbiological and biotechnological approaches to address water, soil and climate problems. The research interests of the group range from biological removal of potential chemical stressors from the environment to bioenergy generation from organic waste.

For more information visit the website at <https://www.arc.agric.za/arc-iscw/Pages/Microbiology-and-Environmental-Biotechnology-Research-Group.aspx> or contact Prof Rasheed Adeleke for more information or to discuss possible research projects and funding opportunities. Send an email to AdelekeR@arc.agric.za or contact the landline on (+27)12-310-2519.

You can also read more on healthy bacteria in aquaponics systems here: <https://www.proagri.co.za/healthy-bacteria-in-aquaponics-systems-can-save-the-world/?lang=en>



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Prosopis glandulosa trees dominate riverbank vegetation. Photo: Ken Coetzee

Invasive alien plants – Prosopis Part 2: **Prosopis spread is a major catastrophe**

by Tisha Steyn

The invasive alien plant, prosopis, is a serious threat to areas in Southern Africa where it threatens water resources, indigenous vegetation and the livelihood of communities who are dependent on these natural resources.

In the previous issue, Ken Coetzee of Conservation Management Services issued a serious warning that the invasive alien prosopis, which is spreading at an alarming rate, urgently needs action to curb further encroachment.

Prosopis encroachment is already covering 1,8 million hectares of grazing rangelands in South Africa. Based on the present growth rate of eighteen percent per year, the size of the invasion can double every five to eight years.

"The rapid spread of prosopis in South Africa is a major catastrophe," says Ken. "It is equally clear that the problem is not being effectively addressed as it should be, and that many millions of hectares of grazing rangelands, rivers, wetlands and groundwaters are at risk.

"Without human intervention, much of our valuable rangelands will be forever transformed into useless,

environmentally damaged prosopis monocultures," he warns.

Description and adaptation

Prosopis glandulosa var. *torreyana* or honey mesquite (*suidwesdoring*) is the primary invasive prosopis species in Southern Africa. It can also hybridise with *Prosopis velutina*, making accurate identification difficult, but both species, as well as the hybrids, are invasive.

Prosopis is a multi-stemmed shrub or small tree that closely resembles an Acacia. It can grow up to ten metres high and forms dense, impenetrable thickets.

It has straight paired thorns and the younger branches are reddish-brown in colour. The tiny yellow flowers are borne on spikes and slightly resemble a small yellow bottlebrush.

The feathery compound leaves are dark green, and each tiny leaflet is 10 to 20 mm long.

The fruits are narrow yellowish or purplish woody pods that are highly favoured by livestock and game.

The prosopis tree is a phreatophyte, which means that it can obtain its water from the saturated zone in the soil just above the water table. Reportedly

having the deepest roots of all trees in the world, the roots of the Prosopis can reach up to 50 metres deep in search of groundwater. The roots spread up to 40 metres laterally, which allows it to also make use of moisture effectively in the upper layer of the soil.

It can tolerate a wide range of rainfall patterns, ranging from a mean of 100 mm to 1 500 mm per year.

Because of its ecological flexibility, it can tolerate from 100 mm to 500 mm of rain per year, and adapts to a wide range of soil types, including stony substrates, terrace gravels, alluvial dune sand, clayey soils, as well as lime-rich and saline soils.

In addition, the prosopis can grow at a rate of up to 30 to 60 cm per year and live up to a hundred years or more.

Prosopis glandulosa seed pods are highly nutritious and eaten by both game and livestock. (Photo: internet)

Reasons for concern

There are several serious issues that landowners seem to be unaware of or prefer to ignore. Prosopis is not a benevolent to indigenous plants for various reasons.

Replaces indigenous plants

By making more effective use of available moisture, prosopis replaces locally indigenous vegetation and out-competes trees that are adapted to arid conditions, such as indigenous Acacia species. Dense invasions of prosopis



Prosopis glandulosa seed pods are highly nutritious and eaten by both game and livestock. (Photo: internet)



The leaves, flowers, and purplish new growth of *Prosopis glandulosa*. Photo: Ken Coetzee.

can lower the water table, putting ground water beyond the reach of the natural local vegetation. It is also allelopathic, which means that it changes the soil underneath it to eliminate competition by prohibiting germination of the seeds and establishment of indigenous plants.

Thirsty

Prosopis has been labelled a water waster, especially where dense infestations occur as it uses more water than most indigenous trees. It typically invades overgrazed, eroded areas that have been affected by drought – conditions that are typical of most rangelands in South Africa.

Adverse conditions for indigenous plants, such as climate change and accompanied global warming, seem to create even more favourable conditions for the spread of this plant invader at the cost of local plants.

Deep-rooted

Its preference for watercourses results in the widespread damage to natural hydrology. The deep roots of the prosopis can damage borehole pipes, block boreholes, and dry up wells and springs. Dense infestations, along with water-carried plant debris, create barriers in watercourses that can divert the normal flow into the surrounding veld alongside drainages, accelerating soil erosion.

Thus, prosopis invasions result in the loss of plants like grasses, sedges and reeds that are adapted to wetlands, and which naturally line and protect riverbanks from erosion during flooding.

Cuts off watercourses

Dense prosopis infestations along watercourses sometimes form an impenetrable wall because of the thorns that prevent animals from getting to the watercourse. This can prevent livestock and game from getting to the water and grazing along these watercourses, as well as shade provided by indigenous trees.

Costly to control

The cost of clearing prosopis encroachment could prevent many landowners from actively fighting the invasion. Farmers in the Northern Cape spend approximately R20 000 per farm per year to control the encroachment. With the ever-increasing spread of the invasion, and the rising costs of herbicide, transport and labour, this expenditure will probably soon increase substantially, which will further dampen enthusiasm to attempt any effective prosopis control.



Source: Flickr



Source: Flickr

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Greenhouses part 4:



Source: Pixabay

CHOOSE YOUR PLANTS

Greenhouses make optimum agri-production possible. However, this achievement is only possible if they are used properly, ensuring that the right plants are grown and conditions are set within the corresponding parameters.

Plant selection is the first and most important aspect to ensure success of the project. As always, the most crucial factor to keep in mind is what the market wants. It does not help to plant produce that you cannot sell. Then your growing method will also be a factor. It makes no sense to try and plant cabbage in a hydroponic gutter system, the plants are too big.

Many vegetables can be grown in greenhouses. Cucumbers, string beans, chilli peppers, tomatoes, spinach, microgreens, peppers, melons, peas, leeks, sweet corn, baby carrots, broccoli, pumpkins, garlic, herbs, squash, Swiss chard, kale, and zucchini are among the favourites.

A variety of cucumbers can be planted. A farmer's selection should al-

ways be made according to the market requirements and demand. One advantage of cucumbers is that they grow very well vertically, meaning there is more produce per square metre, and they produce for long periods giving constant income.

To grow plants vertically you must choose indeterminate seeds, as they form long growing vines. Determinate seed varieties will form bushy plants.

String beans are one of the easiest crops to grow. Their ability to also grow vertically and take up very little space make them a worthy investment. Planting every week or two allows one to have a continual harvest.

As a greenhouse allows for better temperature and quality regulation, a product such as chilli peppers do well in greenhouses. Buyers are drawn to firm and fresh-looking chilli peppers, therefore the farmer who is able to pick his produce early and maintain their quality wins.

For numerous farmers, growing to-

matoes in greenhouses has proven lucrative. This is due to the high yielding tomato varieties able to produce fifteen kilogrammes per plant, and some varieties even more. Greenhouses are beneficial for their production as they will not suffer from broken stems and a decreased harvest if staked or led properly. The greenhouse also offers better disease control and improved irrigation efficiency.

One of the advantages of producing spinach is its ability to regrow after being cut. Not only that, but it grows fast. This means that a farmer can make good returns from the initial planting of one plant!

Microgreens also do well under greenhouse protection as they have very tender leaves. On average they need only 2 to 4 weeks before they can be harvested. Basil, beet, cress, and mustard are examples of these nutrient-rich and pretty leaves. As they are not a common feature in most of SSA they usually sell for a high price.

The colour variety of peppers come in makes them attractive for consumers. Like chillies, peppers are good to sell whilst fresh and firm. Care should be taken to ensure that the outer skin is not damaged or discoloured.

Melons appeal to consumers when they are blemish free with uniform hard skin. The protection greenhouses provide from weather elements and pests makes them a favourite production option.

The possibility to plant successive crops of peas per season makes them a good production crop. There are varieties that can be grown vertically with a lot of production in a small space.

Leeks are generally well priced and require little effort for optimum production.

Maize and specifically sweet corn that is harvested by hand is another good option for production under shade cloth. Adverse weather patterns often make it difficult to guarantee a good crop output. With a greenhouse excess rains, drought and heat stress will not affect it.

Due to their ability to grow when planted at low depths, baby carrots are quite manageable. They do not take long to mature thus can be replanted after harvesting continuously. Broccoli is another good option for greenhouse production. Though a bit challenging to produce with high quality, broccoli usually is constantly in high demand.

Pumpkins are another great greenhouse crop. Their growth direction has to be monitored as they can stray into other crops or end up in an area where they are not required. Best prices for them are just before the market floods or after market flooding,

therefore a farmer with market information can use this information to his advantage.

Garlic is a low maintenance plant and is not attacked by many pests or diseases, although it takes a long time to grow. It must be clean and fresh to ensure that it is desirable for the market or supermarket buyers. Garlic sells well throughout the year.

There is a variety of Swiss chard and kale types to grow. They are advantageous as they do not take long to grow, and the leaves can be cut repeatedly. They are usually easy to care for and grow.

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Source: Pixabay



Source: Pixabay

Obtaining silkworm larvae or eggs to begin your farm is the most essential step in the process of starting a sericulture (silk production) operation. In the second part of this series, we discuss how to properly care for the worms and maintain a clean environment on the farm so that you can maximise your production.

Instrumentation, preparatory materials, and sterilisation

Silkworms that are bred to have high cocoon thread production can be used in bivoltine sericulture, which raises two generations of silkworms each year. This method results in high-quality cocoons.

Regularly cleaned and sterilised breeding equipment and devices help to keep the environment clean and disease-free.

For instance, the rearing room for young silkworm larvae, the rearing room for grown silkworm larvae, the room for mounting silkworm larvae, and the tools for silkworm rearing (papers for the rearing bed, sheets for the shelves, a cocooning frame) all need to be sanitised and cleaned before, during, and after the rearing process.

Before entering the rearing room, the farmer's hands must be washed, and his footwear must be changed to reduce the risk of bringing in bacteria that could cause disease.

The rearing room, the silkworm larvae and beds need to be disinfected before the first feeding of newly hatched silkworm larvae and before the first feeding of mulberry leaves at each instar. This helps prevent the spread of diseases.

Silkworm eggs and larvae

The process of raising silkworms begins with the feeding of newly hatched silkworm larvae. The eggs of the silkworm need to be incubated for about ten days at a temperature of 25 °C, a humidity of 75%, and very particular lighting conditions (16 hours of light to 8 hours of darkness).

In order to ensure a healthy and even birth, the eggs need to be kept in complete darkness for the final two or three days before they hatch. It is essential for the production of high-quality cocoons that all the eggs of the silkworm hatch at the same rate. As they develop, the newly hatched worms must consume finely chopped mulberry leaves almost continuously.

However, when the silkworm eggs are not incubated properly, hatching can take place at any time during the process. It is not possible for silkworm larvae to hatch simultaneously if they are poorly managed, and the environment in which they are reared lacks adequate temperature and humidity.

A producer of silkworm eggs will, upon receiving an order from a farmer, hatch the eggs, and then either deliver

From silkworms to silk garments Part 2:

How to raise silkworms properly

by Natasha Pansegrouw



(Source: Pixabay by 41330)



Cocooning frames made of wood are used by silkworms to spin their cocoons. (Source: pexels by Quang Nguyen Vinh)

the young silkworm larvae to a communal rearing facility or deliver them directly to the farmer.

From the time they hatch until they reach the third instar, silkworm larvae are reared. Their growth is affected by the environment, the mulberry leaves, and the way they are raised.

This larvae stage requires a high level of expertise and a healthy rearing

environment (first and second instar: rearing temperature of 28 °C, humidity of 75 to 80%, clean condition: disinfection in the rearing room, washing hands and changing shoes, cleaning surroundings and the rearing room. Establish a communal rearing house for newly hatched silkworm larvae, care for them until they reach the second instar, and then distribute them to farmers.

Rearing

There are three distinct phases that occur during the silkworm larvae stage: the young silkworm phase, which begins with the first feeding of newly hatched silkworms and ends with the third instar following the second moulting; the grown silkworm phase, which begins with the fourth instar and ends with the formation of cocoons at the end of the fifth instar; and the mounting phase, which begins with the formation of cocoons at the end of the fifth instar.

Young silkworms, mature silkworms, and silkworms to be mounted should all be raised and mounted in different places and at different times. This keeps diseases from spreading and gives the best possible conditions for rearing.

Third instar silkworms

Silkworm larvae in their third instar are still immature even after being distributed to farmers from a rearing house. Growers are responsible for maintaining the temperature of 26 to 27 °C, humidity at 75%, and cleanliness of their indoor spaces. It is difficult to maintain the appropriate habitat when third-instar silkworms are raised in the same rooms as fully grown silkworms.

Mounting

Because mounting has such a significant impact on cocoon quality (reliability percentage, contamination, *et cetera*).



(Source: Pixabay by JakubHardt)



Silkworm larvae just after hatching feeding on a young mulberry leaf. (Source: xyzin-nyc.wordpress.com)



(Source: unsplash.com by David Clode)



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			Windhoek Grootvee	Gobabis Grootvee		
		1	2	3	4	5
6	7	Hochfeld Grootvee	9	10	11	12
13	Rehoboth Grootvee	Nomtsas Grootvee	Windhoek Grootvee		18	19
20	21	22	23	Gobabis Grootvee	25	26
27	Rehoboth Klienvee	28				



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Tuesday	Wednesday	Thursday	Friday
	1 Kalkrand -Goat, Sheep Cattle	2 Gochas Haruchas -Goat, Sheep Cattle	3
7	8 Koës -Goat, Sheep Cattle	9 Keetmanshoop -Goat, Sheep Cattle	10 Mariental -Goat, Sheep Cattle
14 Leonardville -Goat, Sheep Cattle	15 Mariental Cattle	16 Blumfelde -Goat, Sheep Cattle	17 Jimmy O'Kenny Van Rooy Boergoat Wallace Theron Van Rooy/ White Dopers & Guest Sellers Stampriet
21 Independence Day	22	23	24 Omega Meatmasters Consortium Meatmasters Stampriet
28 Monica -Sheep, Goat, Cattle	29 Aranos Stud Auction & Commercial Auction -Sheep, Goat, Cattle	30 Conradie Genetics Sand Dune Lodge Gobabis	31 Mariental -Sheep, Goat, Cattle

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Eggs of a dark colour contain silkworm larvae, and the yellow eggs are unfertilised. (Source: Twitter by Everything Silkworms)



Within the protective cocoon, the larvae transform into the pupae stage of its life cycle. (Source: Pixabay by LoggaWiggler)



When compared to the female silkworm moth, which has a significantly larger abdomen that is full of eggs, the male silkworm moth's body is much slenderer and smaller. (Source: Twitter by Teresinha Roberts)

It is important to ensure that the environment is properly controlled for temperature and humidity. Ideal temperature is 25 °C, and the optimal humidity should be 65% while maintaining good air circulation and ventilation. By doing so, it is possible to collect silkworm larvae that have reached the appropriate stage of development and that are free from deformities or contamination because the cocoons were mounted in a mounting-specific facility using a mounting container. Urination is quite frequent prior to the formation of the cocoon in mature silkworms.

So, if the silkworms grow at different rates, the urine of the slower-growing silkworms could contaminate the cocoons made by the faster-growing silkworms, and a rise in the temperature of the environment could make it harder to reel the cocoon.

As a result, the space where the silkworm larvae are mounted needs to have adequate ventilation. By thoroughly cleaning and disinfecting the mounting container, you can stop the spread of disease.

The mounting process takes only 1 to 2 days and does not involve any temperature regulation, air movement, or ventilation.

As a result of the rack in the mounting container being slightly too large, it is unable to be turned or maintained at the appropriate distance. This results in poor air circulation and higher humidity, which in turn increase the number of contaminated cocoons. In these conditions, it is difficult to shape cocoons in a uniform manner.

It is necessary to grow silkworms in a uniform manner and improve methods of preserving wooden cocooning frames in the appropriate locations.

Disease in silkworms

Silkworms are susceptible to a wide variety of diseases, including those caused by bacteria, fungi, viruses, and even pebrines. Even in a sterile environment, with clean containers and eggs, pebrine, a disease that spreads through the ovaries, can have a significant negative effect on the sericulture industry.

Pebrine has a major negative impact. Due to these factors, it is of the utmost importance that the mother moth eliminates any pebrine that may be present during the phase of silkworm egg formation. If, upon examination, it is discovered that a mother moth has microsporidia, then any eggs that she lays should not be used because they could be contaminated.

Pebrine presents a potential for contamination due to the limited frequency of mother moth inspections. Additionally, a sanitary rearing environment is not always maintained, such as through

the cleaning of the silkworm room and its tools. This leads to concerns over a possible decrease in cocoon yield, and in extreme cases, there is no harvest at all due to the spread of silkworm diseases.

Summary

Silkworm larvae initially have a good appetite and eat voraciously until its final stage. After maturing, larvae search for suitable pupation sites.

Silkworms shrink and become translucent at this stage. These mature larvae secrete saliva from their two salivary glands to cocoon themselves. When exposed to air, saliva becomes silk. Cocoons are usually spun in two to three days.

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Tree nut production in Sub-Saharan Africa Part 5

Add value to nuts

by Tapuwa Mashangwa

Adding value to nuts has always played a vital role within the tree nut production industry. The process improves the profitability of producers, it empowers them, provides safe, quality, and branded food to consumers, reduces post-harvest losses and encourages the growth of subsidiary industries. Modified and enhanced agricultural products attain a higher market value and a longer shelf life.

One of the subsidiary industries benefitting from the value addition of nuts is the culinary industry. Various processing methods are used to create a versatile category of foods and food ingredients. Multiple methods and recipe options produce unique products with wide ranging flavours.

Some of the methods employed are oil and dry roasting, seasoning, and coating and blending.

According to Heat and Control (2022), oil roasting is a process by which nuts are submerged or covered in hot oil and fried. Roasting accomplishes many tasks, including flavour enhancement, shelf stability (1 to 1,5% finished moisture), and destruction of microbes, such as salmonella. For example, almonds require two minutes at 127° C to destroy microbes.

Basic frying principles can apply to most nut varieties (such as peanuts, almonds, cashews, pecans, walnuts, Brazil nuts, and sunflower seeds). Certain nut types, such as macadamias, need special care and handling considering their high cost and fragility. Also, because of their delicate flavour, it is necessary to fry them in high quality oil.

To ensure that the oil quality is correct, potential oils are tested for quality before use. Based on the results, the oil of choice should maximise the freshness and shelf life of the nuts. Common oils used for roasting are canola, safflower, sunflower, peanut, and various hydrogenated blends. For oils that are solid at room temperature, heat tracing generated by steam or electricity sources is used for all piping and tanks.

Roasting can be via batch oil roasting and continuous roasting. In batch oil roasting the nuts in a stainless-steel basket are cooked in hot oil in a machine similar to a chip fryer, whereas with continuous roasting, the nuts travel through roasters continuously via a mesh conveyor system. It is important to manage the frying

process as nuts can easily be burnt, thus the frying time and temperatures have to be efficiently monitored. To maintain consistency, customised conveyors are usually used, especially for a large-scale commercial setup. The conveyor design takes into account the physical and chemical attributes of the nuts to make sure that the production rate and uniform product depth is maintained throughout the roasting process.

Various processes can take place prior to oil roasting that impart a specific mouth feel, taste, and flavour experience (such as brine soaking, coating, and drying). If nuts are dry roasted prior to coating, frying will be required to cook the coating only.

Dry roasting typically involves nuts being tumbled around in a machine, or in a cylinder, which passes over gas fired burners. An even distribution of heat during this process helps prevent scorching or burning. Some machines use hot air to heat the nuts, which in some cases is utilised to decrease oil content.

Heat and Control (2022) states that entry-level processors use forced air or semi-industrial type convection



Source: Pixabay

ovens with nuts in a single layer, stirring regularly to avoid surface burning. Large volumes are typically roasted in custom design drying ovens and include rotary type dryers or roasters.

Certain types of rotary dryers or roasters are designed to lift, to fold, and to expose each product piece to fan-forced heated air thus fluidising the product bed so that the product is more evenly roasted and dried. This process is beneficial not only for traditional roasted nut products, but also for honey-roasted and dough-coated Japanese- or Holland-style nuts.

Independent heating zones allow for precise temperature control throughout the process.

During the seasoning and coating process, glazing oil, water, salt, spice-based seasonings, sugar, dough, chocolate, yogurt, or batters are added to the nuts. To improve the flavour and texture of the nuts, these can be added to the base formulation with frying and drying temperatures to enrich their savour. Colour can also be added to the base flavour to satisfy different market requisites and preferences.

Seasoning is crucial during nut pro-

cessing as it allows snack processors to add sweet or savoury dry ingredients, or a water/oil-based seasoning emulsion to traditional nut products, as well as dough-coated products. The better the flavour, the better the marketability of the nuts, which creates a higher and increasing demand for the nuts and in turn improve the profits!

The coating and seasoning of the nut can be carried out in the processing area, in the packaging room, or on the belt along the line. Unlike on-machine seasoning transpiring in the packaging room, directly before the nuts goes into the weigher/scale and bag maker, process area seasoning happens directly after the dry roaster or after the cooling process and before transferring into the packaging room.

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The use of plastic in agriculture: Part 2

Humankind's search for new materials to use within the agricultural value chain continues to evolve. The evolution is spurred by various factors that influence material choice, such as processing cost, durability, rust resistance, strength, environmental friendliness, safety, simple fabrication, and cleaning ease among others. Metals have played a pivotal role in agriculture from the first appearance of mechanisation in agriculture, and now plastic is becoming more popular for some purposes.

According to Hansen Plastics, plastics have been utilised more prominently in the agricultural sector since the 1940s when a horticulturist, at the University of Kentucky, EM Emmert, discovered that plastic film could be used to protect crops and produce higher yields.

Plastic became more advanced since then, and its use increased due to the fact that plastic is lightweight and durable, corrosion-resistant, easy to shape and mould, cost effective and recyclable.

The most common use of plastics is for protected cultivation, nets, piping, irrigation/drainage systems, and packaging.

For protected cultivation plastic can be found in greenhouses, tunnels, mulching, nursery films, direct covering and for covering vineyards and orchards. Plastic is also used for an array of nets: anti-hail, anti-bird, as windbreaks, for shading, and for olive and nut picking.

In piping and irrigation/drainage systems plastics are used in water reservoirs, channel linings, irrigation tapes and pipes, micro-irrigation and drippers. In packaging they are used for fertiliser bags, agrochemical cans, tanks for liquid storage, and for crates. Other areas of use are in silage films, fumigation films, bale twines, nursery pots and for strings and ropes, cages, tree guards, pond liners and ear tags for livestock.

The common types of plastic employed in some of these agricultural sectors are ethylene-vinyl acetate

copolymer (EVA), polyethylene (PE), polycarbonate (PC), polypropylene (PP), polyvinyl chloride (PVC) and polymethyl-methacrylate (PMMA).

EVA is a copolymer of ethylene and vinyl acetate. Increasing the percentage of vinyl acetate increases the polarity, increases filler acceptance, reduces stiffness, reduces the melting temperature, increases clarity and gloss, and improves adhesion to polar substrates. These traits make it usable for high and low tunnel coverings.

PE is a light, versatile synthetic resin made from the polymerisation of ethylene. Polyethylene is a member of the important family of polyolefin resins. Its use in affordable and flexible plastic film in plastic mulch is attributed to its soft and malleable or hard and tough properties, an incredibly flexible nature.

PC is perfect for greenhouse glazing applications. This use corresponds to its transparency, excellent toughness, thermal stability and a very good



dimensional stability. It can maintain rigidity up to 140 °C and toughness down to -20 °C, or special grades even lower. It is also thermally resistant up to 135 °C and rated as slow burning. According to the British Plastic Federation, polycarbonate is most commonly formed with the reaction of bis-phenol (produced through the condensation of phenol with acetone under acidic conditions) with carbonyl chloride in an interfacial process. PC falls into the polyester family of plastics.

PP is used for bulk bags to store and transport crops and other materials. It is a type of polyolefin which is slightly harder than polyethylene. Its low density and high heat resistance are its strongest traits for use.

PVC is a polymer in which more than half of the content by weight consists of chlorine. PVC is produced by polymerisation of the vinyl chloride monomer and it comes in two basic forms: Rigid (sometimes abbreviated as RPVC) and flexible. The rigid form is the one commonly used for tubing in irrigation and hydroponic systems.

PMMA is a thermoplastic synthetic polymer which displays superior characteristics such as transparency, good tensile strength, and can be processed easily. Its performance can be improved by surface engineering via the use of functionalised thin film coatings, resulting in its versatility across a host of applications, including energy harvesting, dielectric layers and water purification.

The increased use of plastic has also improved research into its new forms. For example, according to Becken (2018) bioplastics are finding their way into the production of agricultural equipment. Over the past decade,

major manufacturers such as John Deere and International Harvester have transitioned both cosmetic and functional components from sheet metal to plastics and bioplastics, with very good results.

As this use of plastics in agriculture continues to increase, it is important that their manufacturing, transportation, use, disposal and recycle/reuse are properly done. The optimum and proper exploitation of their physical and chemical characteristics can significantly improve the agricultural value chain.

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Technews:

The latest in agricultural technology from around the world

by Annemarie Bremner



LEMKEN buys Equalizer

In a big boost for Equalizer, the planter manufacturer in Cape Town, LEMKEN has reached an agreement to buy the company. Equalizer manufactures seed drills in widths of up to 24 m and precision planters up to 36 rows.

Equalizer, which is also a family business, was founded in 2000 and currently employs 180 people. The company serves not only its South African home market, where it is a market leader in precision seeding, but also Australia as its most important export market.

LEMKEN CEO Anthony van der Ley believes that the Equalizer portfolio perfectly complements the LEMKEN seed drill segment and constitutes an important building block for further growth.

"There is no overlap in our portfolios," he comments. "Equalizer offers solutions for customers and markets that LEMKEN has not been able to serve so far. In terms of our growth strategy, the Equalizer planters and

seeders – also in combination with air carts – close a current gap in our product range."

The acquisition is expected to be completed by springtime, and the two companies are keen to expand the South African site. The first definite project is the extensive expansion of spare parts logistics in 2023.

All Equalizer's local staff will be retained. So too will the brand name, and the company will continue to be led as an independent subsidiary by its current management.

"We see great potential for new products with LEMKEN on our side, and we look forward to our future collaboration," says Gideon Schreuder, Equalizer's Founder and Managing Director.

Karel Munnik, Managing Director of LEMKEN SA, says they are very excited about the development as it will allow both companies to grow faster. The news was released in a video by LEMKEN. (Source: LEMKEN)



LEMKEN CEO, Anthony van der Ley, with owner, Nicola Lemken, and Equalizer Managing Director, Gideon Schreuder.

A toast to excellent design



New Holland's Straddle Tractor Concept is the winner of a gold medal at the German Award Design 2023 in the category Excellent Product Design. The German Design Award is awarded by the German Design Council, Germany's design and brand authority based in Frankfurt am Main. The jury members form a unique network of experts in innovations and design.

Revealed at SITEVI (*salon international des équipements et savoir-faire pour les productions vignevin, olive et fruits-légumes*) the Straddle Tractor Concept is a co-production of New Holland Agriculture and Pininfarina, the internationally recognised design house, responsible for Ferrari's designs.

The concept has been explained in a video that has been watched thousands of times on New Holland Agriculture channels by users from all over the world: the idea was specifically designed to meet the requirements of narrow vineyards.

These operations produce high-quality, high-value wines from grapes grown in rows less than one and a half metre wide, often on steep slopes and in small vineyards. In these conditions, grapes are picked by hand and most of the vine maintenance work is done by means of a tractor travelling overhead over the rows.

The futuristic design developed by Pininfarina combines safety, comfort, and technology: it is inspired by the shape of a glass of champagne – tall, wide at the top and tapering down at

the bottom – as a homage to premium wine growers of regions such as Champagne, Médoc, and Burgundy.

The cab is completely made of glass, providing the operator exceptional visibility on the vines and all around, and it is angled in the direction of travel, adding dynamism to the design.

The overall exterior look of the machine stands out for the flowing and dynamic automotive-inspired lines. The exposed frame confers a sporty look.

The interior features a large single door and rotating seat, with use of wood contributing to the cab's plush, luxurious feel, again reminding of wine barrels.

In keeping with New Holland Agriculture's commitment to all aspects of sustainable agriculture and the brand Clean Energy Leader strategy, the concept has been created as ready for electric traction, for a future of machines driven by alternative energies.

Carlo Lambro, Brand President of New Holland Agriculture, says: "The revolutionary Straddle Tractor Concept is the result of the co-operation of two specialists in their respective areas, which offer an elegant design, outstanding innovation, and forward-thinking idea of machines in agriculture."

It is an honour for New Holland to receive this unexpected award, it makes us even more willing to continue to develop safe, comfortable, high-quality, and of course, well-designed machines."

Alfredo Palma, Chief Transportation Designer says: "The futuristic

design of the Straddle Tractor Concept is a balanced mix of functionality and style, where comfort and safety meet a unique personality inspired by the shape of the champagne glass. We are very proud of the collaboration with New Holland and the assignment of the German Design Award is a further endorsement of the great result reached together." (Source: World-Agritech.com)





Prolong the work life of your tines and discs

Bourgault Tillage Tools developed an infused tungsten carbide treatment to protect soil-engaging parts. Called Max-life, and available from the Canadian company's UK subsidiary (BTT UK), field tests have shown that it extends tillage tool working life from 300% to 800%.

The heat-applied weld pool contains solid chunks of tungsten carbide. Spread evenly across the face of the wearing part, field tests have shown that the weld deposit is extremely tough and does not chip or flake when subjected to high impacts.

"It is a cost-effective option for high wear applications across a range of parts and has already proven effective when used on harrow tines, sweeps, spikes, shanks and disc scrapers,"

says Ian Clayton-Bailey, Managing Director of BTT UK.

"Our parent company's 30-year experience in producing hard-wearing parts is really coming to the fore in the current business climate," he continues.

"Having a huge and versatile range of parts is essential for success in countries like the UK, which has hugely variable soil types, climate and topography across a relatively small land mass."

The company has also expanded the range of machines for which its VOS drilling system can be used. Available for some years on Horsch CO and Sprinter drills, it is now available as a tine conversion for the Weaving Sabre Tine, Amazone Cayena and Kuhn Megant drills. (Source: profi)

ExactShot applies fertiliser on the spot



The ExactShot planter/fertiliser applicator is one of the interesting new technologies John Deere revealed at CES 2023-the leading tech-show held in Las Vegas. It applies starter fertiliser precisely to each individual seed. This will help farmers to be more productive, profitable, and sustainable.

"Everything we do at John Deere is focused on real purpose and real impact," said Jahmy Hindman, Chief Technical Officer at John Deere. "This means we are developing technology that enables our customers to provide the food, fuel, fibre, and infrastructure that our growing global population needs."

ExactShot allows farmers to reduce the quantity of starter fertiliser needed during planting by more than 60%. The technology uses sensors and robotics to place starter fertiliser precisely onto seeds as they are planted in the soil, rather than applying a continuous flow of fertiliser to the entire row of seeds.

ExactShot will help farmers to farm economically and environmentally friendly. With the global population expected to grow from 8 billion to nearly 10 billion by 2050, farmers need to increase production by 60% to 70% on today's arable land.

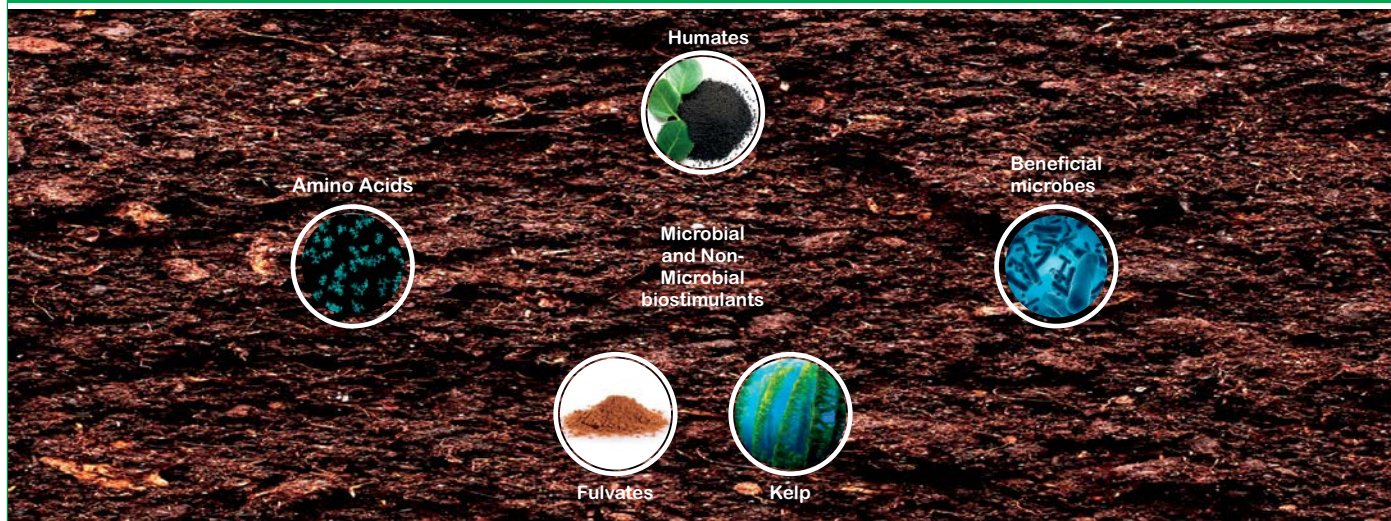
ExactShot uses a sensor to register when each individual seed is in the process of going into the soil. As this occurs, a robot will spray only the quantity of fertiliser needed, about 0,2 ml, directly onto the seed at the exact moment as it goes into the ground.

Across the US maize crop, ExactShot could save over 352 million litres of starter fertiliser annually and prevent wasted fertiliser from encouraging weed growth or increasing the risk of running off the field into a waterway. (Source: World-agritech.com)



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○ PRODUK POSISIONERING

Qwemikelp is 'n vloeibare blaarvoedingskompleks wat help met stresverligting by plante en die regstelling van plantvoedingstekorte.

○ WAAROM QWEMIKELP TE GEBRUIK

- Gebruik as 'n in-voor toediening, saadbehandeling of as 'n blaarbespuiting op gronde met verkeerde pH en voedingvlakke
- Wanneer transpirasie negatief geaffekteer word gedurende stresstoestand
- Waar onvoldoende gewasbestuur plaasvind
- Verwys na die produkietiket vir gewas spesifieke aanbevelings

○ PRODUK EIENSKAPPE

- Die seewier ekstrak bevat ouksiene, sitokiniene asook poliamiene, brassinosteroïede en flortanniene met natuurlike plantgroeistimulante
- Dit verbeter die groei van bywortels, plantgroeikrag, laterale knopontwikkeling, gewasopbrengs, gewasgehalte en rakleef tyd
- Help met weerstand in stresstoestand
- Beweeg opwaarts en afwaarts in die plant
- Dien as 'n energiebron vir die plant
- Is betrokke by koolhidraatsintese in die plant
- Is stabiel oor 'n wye pH-reeks
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