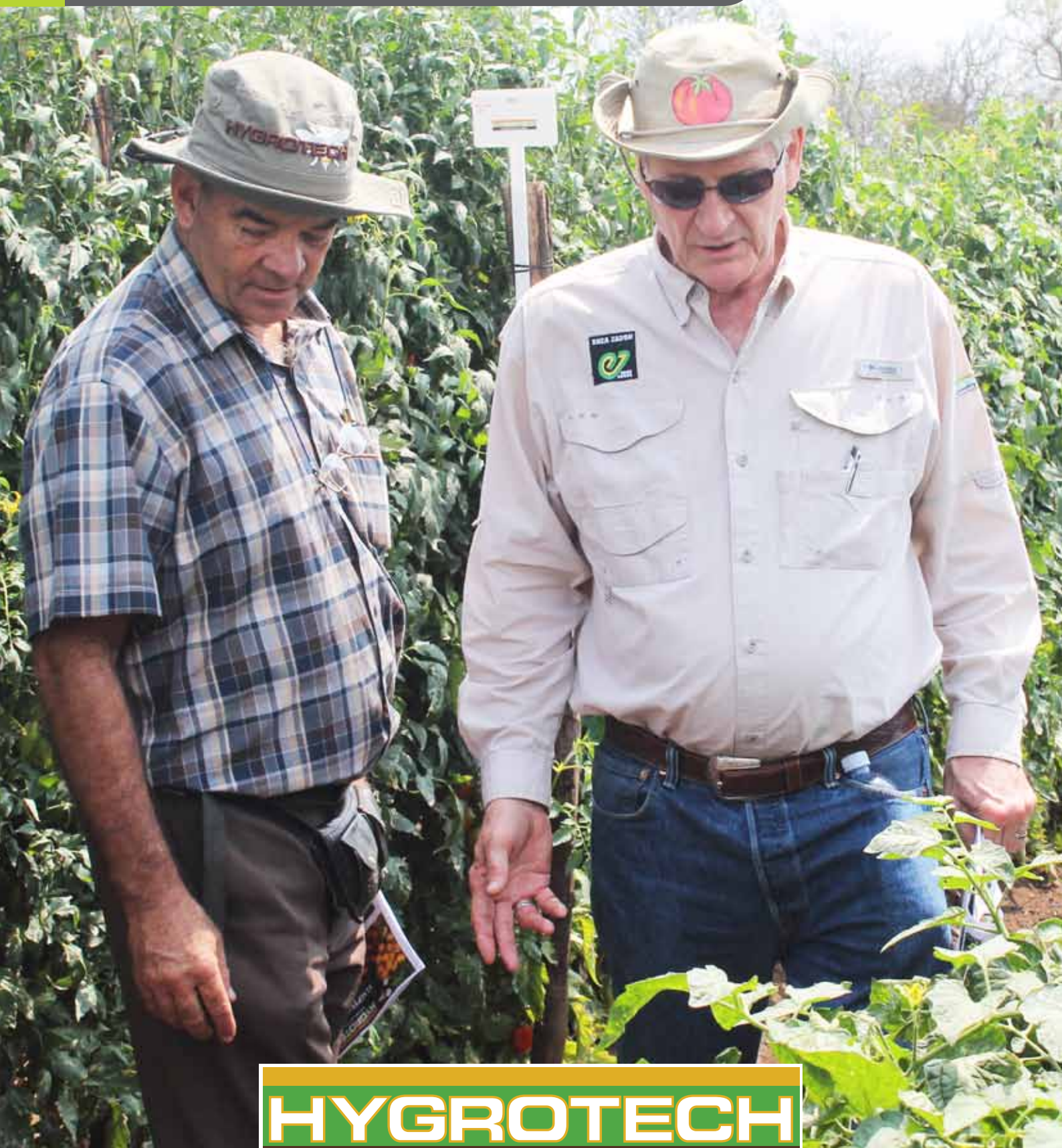


the FORUM



HYGROTECH

SUSTAINABLE SOLUTIONS

INSIDE: Unique Carrots | Sweet pepper success | Tomato breeding genetics
Hy-Tec seed trays | Vonden Gold onion | Speciality lettuce | Biofumigation

VALUE
PAK

HYGROTECH

SUSTAINABLE SOLUTIONS

QUALITY VEGETABLE SEEDS FOR THE PROFESSIONAL GROWER

HYGROTECH'S PROFESSIONAL SEED AFRICAN PACKS

Hygrotech derived from

HY - Hybrid GRO - Growing TECH - Technologies

Hygrotech pioneered the development of F1 Hybrids in the South African vegetable industry.

Offering a "one stop" service to more than 4 000 farmers throughout South Africa, Hygrotech offers seed, adjuvants, growth stimulants, seedling systems (seed trays, growing medium and sowing machines), fertilisers, foliarfeeds, biological products, plant manipulators and mechanical implements – in short many of the necessities for the modern vegetable farmer, and agriculture in Southern Africa.

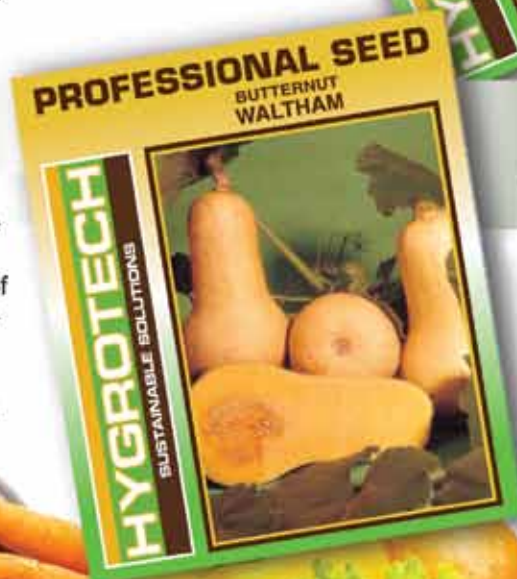
Hygrotech's African Packs are Value Packs containing quality professional seed meant for the small scale grower or home gardener with small holding properties wishing to grow mainly vegetables. Each pack is fully traceable to it's source by means of a professional lot number.



STAND OPTION

Hygrotech will supply the stand free of charge should a minimum order be requested that fills the majority of the stand. The stand will remain the property of Hygrotech.

Options are available to purchase a stand, please contact us for further details.



"CHOOSE FROM AFRICA PACK RANGE"

Open pollinated vegetable seed
Please enquire for cost of packets



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SUSTAINABLE SOLUTIONS

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041 922 9466

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WESTERN CAPE

Stellenbosch

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Vredendal

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023 316 209

Malmesbury

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CONTENTS

ON THE COVER: Serious discussions between Pieter Ernst (left) from Chokwe, Mozambique and Habe Roode, Chairman and founder of Hygrotech.

Leaders in the central Lowveld

4

Unique hybrid carrots

5

Sweetcorn

6

Sweet Pepper success

8

Tomato breeding - new genetics

10

Hy-Tec seed trays

13

Magic Bean

14

Vonden Gold

16

Field Day - Komatipoort

18

Speciality lettuce

20

Lucerne - HLS 9.2

23

Onion Charlize

24

Onion Sirius

25

Onion successes in the North

26

Miller Chemicals

28

Biofumigation

30

Zinc and plant nutrition

32



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This information is based on our observations and/or information from other sources. As crop performance depends on the interaction between the genetic potential of the seed and variety, its physiological characteristics, the environment including climate, disease pressure, water quality and quantity, management etc., we cannot give any warranty expressed or implied, for the accuracy, performance or applicability for the information, recommendations or products supplied, nor for the performance of crops or products relative to the information given, nor do we accept any liability for any loss, direct or consequential that may arise from whatsoever cause. * These cultivars are not on the official cultivar list, but applications have been, or will be submitted.

LEADERS

in the Central Lowveld

By Johan Stassen, Technical Manager

Hygrotech offers a focussed range of dark green marrows that offer growers in the Central Lowveld yield, quality and resistance!

Hy-Green has slowly but certainly become the benchmark for yield potential and quality in the Mooketsi Valley. The strong fast growing plant produces early fruit that can be picked as courgettes (small) and also produces cylindrical larger fruit that is ideal for bulk and processing marrows.

In the Ofcolaco, Harmonie Block and Hoedspruit areas, Desert has become the variety of choice due to its stronger resistance/tolerance to viruses of the Potyvirus group.

Although no specific resistance is claimed to the Moroccan strain of Watermelon mosaic, Desert showed a substantial higher field tolerance to this virus in fields where it was positively identified in other infected varieties.

Desert produces cylindrical, dark green fruit of excellent quality. Fruit can be picked as courgettes (small) and like Hy-Green is well suited for bulk and processing marrow production.

Both varieties have good Powdery Mildew tolerance and Desert offers additional resistance/tolerance to Cucumber Mosaic Virus.

Full disease packages of these varieties are:

Hy-Green

Px (Powdery Mildew); ZYMV (Zucchini Yellow Mosaic Virus); WMV (Watermelon Mosaic Virus); And PRSV (Papaya Ringspot Virus)

Desert: IR:

Px (Powdery Mildew); ZYMV (Zucchini Yellow Mosaic Virus); WMV (Watermelon Mosaic Virus); PRSV (Papaya Ringspot Virus) and CMV (Cucumber Mosaic Virus)



The long peduncles of Desert allows for easy picking



High quality cylindrical fruit of Hy-Green in picking crates.



Note the regular set of quality fruit on Desert.

This perfect field of Hy-Green was grown by Mr. Justin Pohl in the Mooketsi Valley.

UNIQUE F1 HYBRID CARROTS

for summer production

In the early nineties most carrot producers planted summer cultivars like Rhoda 249 and Regal. These were all very successful cultivars in the carrot market. Since then, the carrot industry has shifted to F1 hybrid cultivars with better disease packages, nicer appearance, higher yields and excellent taste.

Hygrotech has introduced two new summer hybrids after extensive trials. These cultivars have been trialed by Johan Terblanche in the Philippi area and by Manny Salgado in Balmuccia, KZN this past summer. These new hybrids, Ernè and Anri, have impressed with their strong growth, dark orange root colour and small core. Both were also market-ready 14 days earlier than the commercial cultivar and showing good resistance against Alternaria. The yields were also significantly better on account of earlier harvest readiness... thus resulting in bigger carrots. The leaf attachments are very strong, making these two cultivars also suitable for mechanical harvesting.

Furthermore, the strong leaf attachments make these varieties very suitable for the bunching/"bossie" market, meaning that these multi purpose carrots can be pre-packed from 500g to 1kg pack sizes. The smooth cylindrical carrots are well rounded at the tips, making them suitable for the pre-pack market as well.

The seed sizes are very suited for the warm summer months with sizes varying between 2.0mm and 2.4mm. This will result in a good plant stance which will have a positive effect on yields.

Best sowing time is from 1 October to end of February. Grab the opportunity this coming season and be proud of the yields achieved with this new breeding material in the carrot industry !

Best sowing time is from
1 October to end of February.

Ernè



Anri



No need to look anywhere else for **sweetcorn!**

This season's new focus and aggressive supporting systems in the growing of sweetcorn have shown numerous successes. Supporting growers with continued technical information, planting of trials as well as going the extra mile in partnering with growers assuring high quality seeds and competitive pricing, have resulted in outstanding yields and packout percentages. Team efforts from technical personnel down to logistics have ensured that Hygrotech has once again become a market leader in sweet corn.

Traditional varieties in Hygrotech such as Gladiator, Aristocrat and Rustico have paved the way into introducing new focused varieties in several markets. This article will allow the farmer to make up his own mind which variety will suit him the best in his specific growing area and season.

Jubilation

NAME	SILK	TASSEL	HUSK COVER	COB LENGTH	COB WIDTH	ROW NO.	KERNEL COLOUR	TIPFILL	RUST	NCLB	MDMV
Jubilation	67	67	1	19.9	5.4	18	1	4.6	2	3	7

Jubilation has shown consistent results from processors and fresh market farmers and has been a reliable variety for germination, yield as well as disease resistance even when growing conditions were challenging the variety.

Extreme heat conditions and severe challenges in disease pressure conditions as well as good shelf life and slow dimpling, showed the reliability in Jubilation as a favourite choice in sweet corn varieties.



Escalate

NAME	SILK	TASSEL	HUSK COVER	COB LENGTH	COB WIDTH	FLAG	ROW NO.	KERNEL COLOUR	TIPFILL	RUST	NCLB	MDMV
Escalate	66	68	2	21.6	5.4	2	18	2	3	1	3	8



Escalate has taken the winter fresh market by storm being able to produce higher marketable cobs as well as consistent results in challenging colder soil conditions. Results from processors also favour the growing demand for Escalate with its longer cob as well as good kernel recovery.

New additions to the above two varieties are ZHY08740 and ZHY2269. We are inviting all sweet corn lovers to try new varieties which are available this season.

The new pre-packer double cobs from Hygrotech! ZHY0874.

The new improved Gladiator ZHY3006.


ZHY0874
ZHY3006

The only way you can
reap the harvest is by
knowing what you have,
how you can implement it
and how you can manage
it successfully!!



AANDAG ALLE WEIDING-SAADKWEKERS!!!

Hygrotech is opsoek na eersteklas saadkwekers vir die uitkoop en produksie van die volgende weidingsade:

- Alle somergrasse (Rhodes, Smutsvinger, Blou en Witbuffel, oulands en tef)
- Alle winterkleingrane (hawer, stoelrog, korog, gars)
- Peulgewasse (akkerbone en sonhennop)
- Lusern (sa standaard, asook Hygrotech eksklusiewe hoë dormansie varieteite)
- Ander gewasse (radys, raap, babala en alle raagrasse)

Hygrotech bied TOP pryse aan kwalifiserende kwekers landswyd, vir die uitkoop van bestaande saad asook kontrakproduksies van toekomstige aanplantings op bogenoemde gewasse.

Vir meer inligting skakel J.J. de Klerk by
072 376 9706 of epos
voerenweiding@hygrotech.co.za

ATTENTION ALL PASTURE SEED PRODUCERS!!!

Hygrotech is looking for first class seed producers for the production and buying of the following pasture crops:

- All summer grasses (Rhodes, Smutsfinger, Blue and White buffalo, eragrostis and teff)
- All winter small grains (oats, stooling rye, triticale, barley)
- Legumes (cowpeas and sunhemp)
- Lucerne (sa standard, as well as Hygrotech exclusive high dormancy varieties)
- Other crops (radish, turnip, millet and all ryegrasses)

Hygrotech pays TOP prices to all qualifying seed producers across the country. We do buy-outs of existing harvests and put up contracts on future plantings for all above mentioned crops.

For more information contact J.J. de Klerk
on 072 376 9706 or email
voerenweiding@hygrotech.co.za

Excellent **sweet pepper** variety + meticulous grower = **SUCCESS**

By Johan Stassen, Technical Manager

Sweet Pepper Bunker and Makepisi Agri grower Alfie Pohl, have proven to be the perfect match.

Makepisi Agri has planted Bunker for a third season after previous good results and the verdict is out that Bunker is the variety of choice. Especially for plantings growing from winter to spring in the Mooketsi Valley.

Alfie believes that a crop of peppers should be grown optimally, not taking any shortcuts as far as fertigation and pest management are concerned. The result is probably the best pepper crop around, this season.

The benefits of Bunker, according to Alfie and Carel Pohl, are:

1. High set of excellent quality, blocky early fruit.
2. Very good leaf cover
3. Uniform plant quality and continuous fruit set
4. Dark green quality fruit with high pack-out percentage

During the recent visit of the Enza Zaden pepper breeder, Eduardo Villanueva, he confirmed that this was one of the best Bunker fields he has come across in his travels worldwide.



A very proud Alfie Pohl (middle) in perfectly grown field of Bunker. With Alfie is Dirk Le Roux (left) of Hygrotech and Carel Pohl (right), Agricultural Manager at Makepisi Agri.

Dirk Le Roux, Matome Ramokgopa (Enza Zaden) and Eduardo Villanueva (Enza Zaden Lead Pepper Breeder) in another high quality field of Bunker at Makepisi Agri.



Carel Pohl, showing off the heavy, uniform and early set of Bunker.

Eduardo Villanueva, Matome Ramokgopa and Dirk Le Roux inspecting the high quality packed product of Bunker in the pack-house.





TRANSPLANTERS

M6000 CELL TRANSPLANTER



Plants up to 4200 tray grown seedlings per row p/h

M900 MULCH PLANTER



For planting cell or peat pot transplants through mulch

M1000 BARE ROOT PLANTER



Plants up to 3600 plant per row per hour.

M90 MULCH LAYER



Lays plastic mulch up to 1.8m wide

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or visit: www.hygrotech.co.za

Taking **TOMATO BREEDING** genetics to the next level

Hygrotech is proud to announce that access to various tomato breeding programmes from exclusive suppliers of new style tomato sub-species, have revealed outstanding new traits with specific reference to disease resistance packages, adaptability, unique fruit quality and shapes, and vigorous plant types.

These unique characteristics are incorporated in indeterminate rounds and saladettes, determinate rounds and saladettes as well as hawker and processing types for short poles and on-the-ground culture.

Here is a collage of highlights of exiting new releases that incorporate all of the above traits.

PROSESSING AND HAWKER



Qwanto

H 1015, the world's most used processing variety from KRAFT HEINZ with earliness, high yield, thin viscosity, EFS and very high yield potential: VFF, N, Bsp, Asc, St, Cm(T).



H 1015

QWANTO, a very unique processing variety from KRAFT HEINZ and mostly used as an advanced hawker tomato that is well adapted in the eastern regions of Southern Africa under subtropical conditions. High yielding, strong plant type and foliage, extremely firm, 90 – 110g fruit and a beautiful typical saladette shape: VFN Ty Bw.

UNIQUE, LARGE FRUITED HAWKER AND FRESH MARKET TYPES

ROMAR – Large, firm, elongated fruit with good colour and taste producing up to 200g fruit with thick walls enhancing firmness and the ability to hold in long distance transporting. One of the best disease resistance packages of such hawker/ saladette type tomato. Grown on the ground or on short stakes. Tomato: VFFF, N, TYLC, TSWV, Pst, Xcv

ROMAR



MAXIMO 2



MAXIMO 2 – Large, firm, square round / blocky fruit producing up to 180 – 200g fruit with thick walls resulting in very high yields filling the hawker crates quickly. Grown on the ground or on short stakes. Very good fruit set and holding on the vine. Good disease resistance package: VFF, N, TYLC, TSWV

MAXIMO 3 – Medium large, firm, elongated square fruit producing 160 – 180g fruit with thick walls and can be packed and sold as a saladette fresh market tomato, with smooth shoulders and small stem scar. Can be grown on the ground or on short stakes. Excellent disease resistance package: VFF,N,TYLC,TSWV,Pst

MAXIMO 3



F 350

F 350 – Medium large, high shouldered and slightly pointed, very firm, attractive 140 – 180g saladette type fruit. Very vigorous plant with strong leaf cover and outstanding continuous setting ability. Very high pack-out potential with uniform fruit size and thick walls. Widely adapted. Exceptional disease resistance package: VFFF,N,ToMV,TYLC,TSWV,Pst, BW(T)

F 350 - ONE HELL OF A TOMATO

DETERMINATE ROUDS

DEGAS – Round, smooth, firm 160 – 180g fruit, thick walls, champagne to red when fully matured, small blossom-end with jointed peduncle. Plant height 1.2-1.5m and need to be staked. Vigorous plant with good leaf cover and 4.5 fruits per truss. High yield potential. Disease resistance package : V, FF, N ToMV, TSWV

DEGAS



SETTLER

SETTLER - Flat round, very firm, uniform, 130-160g fruit, gourmet fruit quality, early concentrated set. High yield potential, long shelf life. Plants grow 1.2-1.4m high and need to be staked to the 1.5m wire. Good disease resistance package; V, FF, ToMV, N, TSWV



SISLEY

INDETERMINATE ROUND

SISLEY – Flat round, uniform fruit with uniform green shoulders, 135-150g fruit mass, small blossom-end mark with jointed peduncle, cultivation under protection and open-field, fresh and pre-packed market, vigorous plant with good leaf cover and reacts well on root stock, high yield potential with excellent storage ability, red fruit colour when fully matured with thick walls. Good disease package; V, FF, ToMV, N, TSWV, high tolerance to Bacterial Wilt.



INDETERMINATE TYPES – 1.8 TO 2.0M TRELLISING

BOUDICA round – Flat/round very smooth shouldered, large, firm, fruit with remarkable small blossom and stem end scars. Suitable for open field – pruned to the fork - with 160 – 180g fruit, and in greenhouses pruned to single or two stems with 200 – 220g fruit. Vigorous plant with good setting, 4-5 fruit per cluster and of good quality for fresh market packs. Good disease resistance package: VFF,N,ToMV,Asc,TYLC,TSWV



BOUDICA



PORTIA

PORTIA saladette – Beautiful smooth and uniform saladettes (oval) fruit with very good firmness. The high quality fruit of 130 – 150g have a good shelf life and flavour for pre-packing. This variety can be produced outside on 2.0m trellises but is also suitable for green house production when fruit sizes can reach 150 -160g with single or two stem pruning. Excellent disease resistance package: Va,Vd,FFF,N,For,TSWV,TYLCV,Pst

INDETERMINATE MINI PLUM

SALADITA – Very attractive, firm fruited plum of 15 -25g fruit size. Vigorous, open, medium generative growth habit. Fruits are tasty and with a long shelf life when picked at full maturity. Disease resistance; FF, ToMV. Grafting on Hygrotech rootstock SIMSON is highly recommended for greenhouse production.



SALADITA



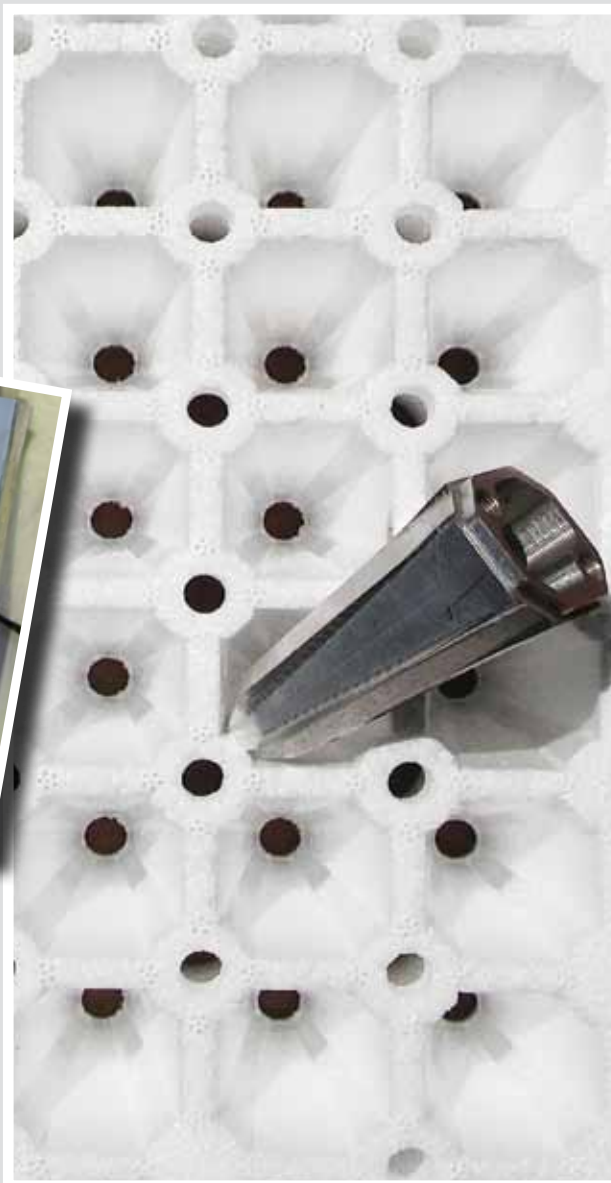
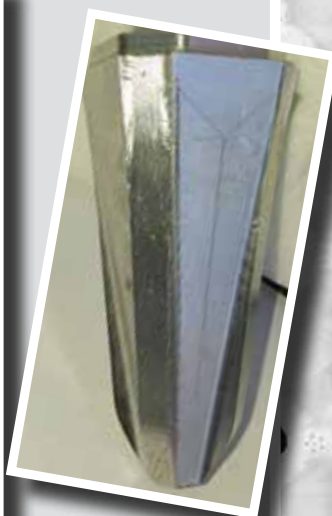
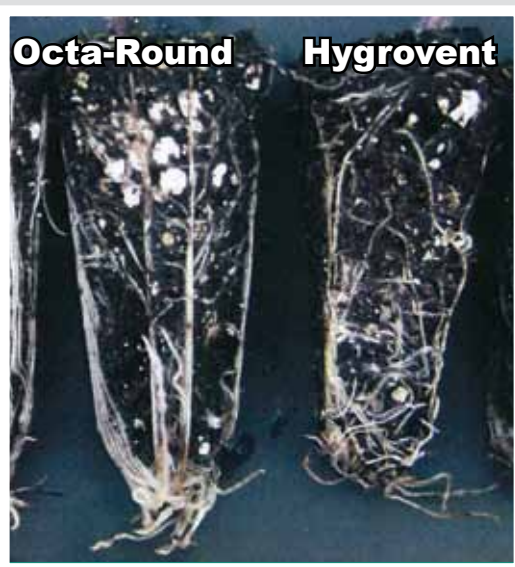
SWEETHARD

SWEETHARD – Tall, medium, open indeterminate type, with plum shaped fruit with square shoulders. Fruit size vary between 10 – 20g. Unique "Spider Calix". Very sweet taste – in soil Brix 8-9% - crunchy, firm fruit without green shoulders and good crack resistance. Fruit well attached to truss, no fruit drop. Harvested loose or truss. Must be fertilized in generative direction N:K>1:1,8 from third truss onwards. No claimed disease resistance but strong general field tolerance. Grafting on Hygrotech rootstock SIMSON is highly recommended for greenhouse production.

HY-TEC SEED TRAYS

A REFRESHER COURSE

After the demise of the official marketing channels of the **SPEEDLING TRAYS** that were introduced by Habé Roode in 1978, Hygrotech started developing their own **HYGROVENT SEED TRAYS** in the late eighties with its unique characteristics of being ventilated on each corner of the seedling cavity as well as the Drainguard concept.



A few years back Hygrotech raised the bar by designing, developing and manufacturing a brand new concept of an off-set eight sided cavity suitably named **OCTA ROUND** which some nurseries have already incorporated in their use of seed trays.

This advertorial will focus on Hygrotech's flagship seed trays, namely **HYGROVENT** square model 242 and **OCTA ROUND** square model 200.

The **HYGROVENT 242** is replacing most of the old fashioned 200 cavity type seed trays with the emphasis on economics of scale. Since most standard size seed trays have the same size - 67.75cm x 34.5cm – and depth 6.0cm, the model 242 has the following "savings".

- **HYGROVENT 242** slightly cheaper than the **HYGROVENT 200** but with 42 or 21% more cavities per seed tray therefore saving R3.15 per seed tray.
- Practically saving close to 20% growing medium per cavity because of almost similar cavity size than other model 200 seed trays.
- When converting to **HYGROVENT 242** seed trays a nursery can produce 21% more plants in its nursery without expanding or enlarging the nursery.

In another equation 1040 plants per m² can be produced in **HYGROVENT 242** compared to 859 plants per m² in other model 200 seed trays.

The **OCTA ROUND** concept provides a unique eight sided cavity, compared to the "old" **SPEEDLINGS** and **HYGROVENTS** with four sides and even older round cavities where the roots can "play" in circles. The 8 sides are off-set with 4 of the 8 sides curved out to incorporate the "Drainguard" concept that prevents growing medium from sifting out with watering and handling.

The **OCTA ROUND** cavity is 5mm deeper to allow slightly longer root development down the eight off-centred sides. It is **WORTHWHILE** to try this unique **OCTA ROUND** concept !

Please contact your local Hygrotech branch or sales representative for a sample of the **OCTA ROUND** seed tray.

MAGIC BEAN



“Magic Bean makes you climb a beanstalk to reap the success of the treasures within each new bean”

By Luhan Swart, Technical Manager

New improved genetics from our in-house breeding programme allows Hygrotech to take up first position in the current green bean market. Years of research and breeding for specific markets have now resulted in the introduction of several new specific varieties for specific markets.

The market for green beans is classified into extra fine, fine, bobby and processing types and the new MAGIC BEANS are each being classified into these specific categories. In one year 4 new green bean varieties received very good feedback from the producers experiencing the unique adaptabilities of our new genetics. The current market leader variety Tahoe also stood up against the onslaught of opposition varieties.

These varieties include the following:

Variety	Type	Market segment	Length cm	Diameter mm	Pod colour	Pod setting	Disease resistance	Note
*Escape	Bush bean Fine	Pre pack export	14-15	7-7.5	Dark green	Continuous	BCMV Rust	Extremely good export bean with high pack out and quality
*Dakar	Pole bean Fine	Pre pack export	14-15	7.5	Med green	Continuous	BCMV	High pack out quality pole bean with good agronomic characteristics
*Casablanca	Pole bean bobby	Pre pack export	14-15	8-8.5	Dark green	Continuous	BCMV	High pack out quality pole bean with good agronomic characteristics
Envoy	Processing	Processing	14-15	8.5-9.5	Med green	Concentrated	BCMV Rust	High yielding Slow seed development good disease resistance
Tahoe	Bobby	Fresh market	13-14	9.0-9.5	Dark green	Continuous Spreading	BCMV Rust	Market leader



Tahoe Beans



Mr Gbenga (Nigerian farmer)



Dakar pole bean 1



Field of Envoy



Close up of the current market leader Tahoe

Vonden Gold

Vonden Gold, Hygrotech's newest addition to the very early short day onion segment, has been a revelation in early maturity and bulb quality to the farmers.

It is a small, yet critical segment in the Northern Cape onion growing areas and we are confident in Vonden Gold to become the fastest growing cultivar in the Northern Cape, not just in maturity, but also in the market share it will achieve in the years to come.

With careful planning of planting dates the grower has the luxury now of planting Vonden Gold, Vonden, Megan and Rachel. When planted in this order, the four varieties will reach maturity with the tops going down 5 to 15 days apart.

Cutting, pulling and wind-row stacking can now be well planned to sell a very good range of varieties into the market.

What makes Vonden Gold stand out?

The balance between early maturity and quality is one of the best characteristics. Speed of growth and bulb firmness are very closely related.

Vonden Gold's speed of growth is due to the smaller plant frame and thinner necks resulting in quicker and more uniform fall of the plants without thick necks. Vonden Gold does not have the tendency to give very big unmarketable bulbs. With proper plant populations, Medium-to-Medium Large is the majority of the crop's bulb size distribution.

Be sure to consider Vonden, Vonden Gold, Megan and Rachel in your onion-planting programme for next year's early April planting slots on your farm.



Vonden left, Vonden Gold centre and Control right.



Beautiful Vonden Gold uniformity.



Vonden Gold's perfect size distribution.



Fanie Verwey proudly manned our display for the day.

Hygrotech attended the yearly Northern Cape Onion Growers Association day at Broad Water Estate in Douglas on 22 September 2016.

The day started with 3 guest speakers. Uys Krige (Omnia), Schalk Geldenhuys (Bayer Crop Science) and Jan-Louis Bezuidenhout (Sakata) addressed the delegates about general onion growing practises.

After the presentations, the attendants were well treated to an array of snacks, food and drinks.

This well-planned day with Onions as the main topic, lasted till late at night with plant slots, varieties and special techniques being the main points of discussion.

Thank you NKUPV, Leonie Haak and Kolver Mulke for a well planned and excellent day.

Field Day for growers of sweet peppers and tomatoes – Komatipoort

Hygrotech wants to thank Mr. Jakkals Steyn, owner of JF Steyn Boerdery, Komatipoort, for allowing us to showcase some of our excellent varieties at this Field Day that took place on 15 September 2016.

Like before, farmers and producers, local as well as from far and wide, attended and made use of the opportunity to experience and see the good horticultural practices prevalent on this farm. Needless to say, the trials once again compared to the best anywhere.



In amongst the tomato trials are from left to right: Nico Combrink, a farmer from Komatipoort, Jakkals Steyn of JF Steyn Boerdery, Komatipoort and Ruan van Dyk, a farmer from White River.



A well prepared sweet pepper trial with its produce on display in crates.



Michael Luttig, Hygrotech Area Manager from Nelspruit, welcoming farmers, growers and guests.



Serious discussions between Pieter Ernst (left) from Chokwe, Mozambique and Habe Roode, Chairman and founder of Hygrotech. Habe is also a sound, technical tomato expert.



Habe Roode, Chairman and founder of Hygrotech (left) handing over a certificate and long service award to Willie van Heerden, a Hygrotech stalwart for many years in the Lowveld, who announced his retirement.



Michael Luttig handing over a gift to Jakkals Steyn (middle) with his two sons Ruan and Francois Steyn (far right) looking on.



Michael Luttig handing over a 'lucky draw' prize to Albert Horn (left) from Parma Nursery, Hoedspruit.



Johan Stassen, Technical Manager, in his favourite position talking to the peppers!



From left to right: Dirk le Roux, Pieter Vorster, Johan Stassen and Herman de Beer, Hygrotech personnel in attendance.



Luhan Swart (Hygrotech) with Pieter Ernst (4th from the right) and his group of tomato farmers from Chokwe, Mozambique who attended the field-day.



Luhan Swart (Hygrotech) having a 'tomato' conversation with Kobus van Staden (left), a farmer from the Strydomblok, Komatipoort.



Technical details of tomato's are discussed by from left to right: PJ Fourie, Hygrotech National Product Development Manager, Kobus van Staden, farmer from the Strydomblok, Komatipoort and Luhan Swart, Hygrotech Technical Manager.



Speciality **lettuce development** for processing segment

By Michael Pinto, Product Manager

Hygrotech has been working hard this year developing a new range of speciality lettuce varieties ideal for the processing segment. From the "one-cut" Eazyleaf range, to our new compact butter's – you are sure to find what you are looking for in our range.

Eazyleaf Range

What makes Eazyleaf concept so unique?

Firstly, Eazyleaf is extremely easy to cut and prepare. In just one cut, the plant splits into many leaves, all equally sized with the smallest possible cutting surface to protect excess exposure to oxidation and therefore extend shelf life of your final product.

Secondly, the below range is suitable for both the processing industry and the fresh market that may sell the crop as whole-heads. This makes the range quite versatile!

Thirdly, the range is ideal to process mechanically. Farming costs in South Africa are on the rise and more and more farmers are looking for ways to be as efficient as possible. From sowing, planting and harvesting, right to processing and packing – these varieties have been selected to be well suited for certain farming aspects to be done mechanically. Also, the leaf type and plant structure of these varieties are such that very little is wasted.

Finally, the range is visibly appealing and has superb eating qualities.

Most of the range have already been approved by top supermarkets and processing company's nationwide. Make sure you include this range in your programme and reap the rewards of the Eazyleaf range today!



Ezatrix

Resistance HR: BI:16-32/CA1-8/Nr:0/TBSV

Resistance IR: LMV:1

Ezatrix is considered a "true Italian oak"- a unique line in South Africa. The variety is compact yet open and yields many leaves of the same size with a small cutting surface (see picture below). Ezatrix is a common favourite with Hydroponic and Open Field farmers. Ezatrix also pairs well with our red Buckley that has a similar leaf type.

Ezabel

Resistance HR:

BI:16-27,29,32/CA1-8/Nr:0

Ezabel is a round, compact blond variety. The variety is also characterised in having good uniform behaviour in indoor and outdoor productions. Ezabel might also be a good selection for producers looking to replace existing Lollo Bionda / Batavia lines with Ezabel as it has the volume of a Lollo / Batavia, but the "one-cut" benefit of a Eazyleaf, ideal for processing. Ezabel also pairs well with our Red Ezmina.



Verdetrix

Resistance HR: Bl:16-32/CA1-8/Nr:0/TBSV

Resistance IR: LMV:1

Verdetrix is a shiny dark green compact variety with an excellent leaf structure, shape and sweet flavour. Fast becoming a firm favourite for processors and markets.



Buckley **New**

Resistance HR: Bl:16-32/CA1-8/Nr:0/TBSV

New red oakleaf with a similar leaf type to Ezatrix. The variety is fairly upright, which is ideal for mechanical harvesting – however Buckley can also be used as whole-heads.



Temira

Resistance HR: Bl:16-26,28-32/CA1-8

Temira is slightly smaller than Volare and Marbelo. Temira has a great fresh lemony green colour, easy harvesting, excellent head uniformity & fill, with strong bolting tolerance and good field holding.



Compact Butter Range

South African farmers have traditionally been growing large butter varieties to supply the processing butter segment. However, processing companies can only make use of smaller inner leaves of large butter varieties to obtain that small size that they're after. A smaller leaf is ideal as the whole leaf can be used without needing to recut into smaller leaves. This in turn enhances your products shelf-life, as oxidation is limited to one smaller cutting surface in comparison to several and large cutting surfaces that you would experience if you recut leaves into smaller pieces.

Hygrotech, together with Enza Zaden have introduced a new range of compact butter varieties specifically for the processing segment.



Overview of benefits that our Compact Butter Range provides processors and farmers in comparison to traditional Large Butters:

- **Less waste** – as higher percentage of leaves are smaller in size.
- **Leaf spec** – ideal sizing for processors.
- **Shorter growing period than traditional large butters** – faster turnaround time for farmers. A faster turnaround time means a higher product output in the same time, as well as lessening the risk of variety damage (the longer a plant is in the ground, the longer they are subjected to natural causes such as pests and severe climate that cause product loss).
- **Less space required than traditional large butters** – saves farmers more land space.
- **Flexibility to be used in various growing systems** – these varieties are ideal for intensive hydroponic systems as well as open field productions (larger butters tend to get too big in hydroponic systems)
- **Market flexibility** – these varieties can be used for processing or medium size whole-heads for the fresh market.

Volare

Resistance HR: Bl:16-27,29,31,32/CA1-8/TBSV

Volare is sized in between Temira and Marbelo. The variety is suited for processing as well as fresh market heads. The variety is being used for year-round production, but it is particularly useful in winter due to it being early maturing.

The variety is characterised by a high level of usable material that is easy to peel even if left to over mature. High tolerance to bolting and internal tip burn. Volare has also been noted from one of South Africa's leading markets, as having a very good flavour.



Marbelo **New**

Resistance HR: Bl:16-32/CA1-8

Marbelo is a newcomer to the range. The variety was selected as being one of the most adaptable in open field production. The variety has a good shape and colour for the fresh market and good heart quality for processing. Marbelo is also one of the largest and fastest to mature of the three.



LUCERNE – HLS 9.2

JJ de Klerk – Technical marketing manager: Forage and pastures

We are often amazed at what technology can do today. Look at your smartphone. The limitless connectivity and functionality you have in the palm of your hand. Yet it seems so useless when you walk into a lush green lucerne field with vigorous growing plants, and the temperature of your phone tells you it will be shutting down due to overheating. It's moments like this that I remember why I love Agriculture. No matter how much we try, nature always trumps our best efforts in the smallest ways.

This field in particular is situated just outside of Prieska in the Northern Cape. Despite the extreme heat, we had the privilege of visiting this stunning field of HLS 9.2 (see pics) planted in the last week of July 2016. The field was a few days from its second cutting and the photo's speak for themselves.

HLS 9.2 has become known for three distinct characteristics. One, its ability to tolerate saline soils and water. HLS or 'Hygrotech Lucerne Salt' has been specifically bred and selected to have significant higher tolerance to saline soil and water than other rival dormancy 9 Lucerne's. Secondly, as with all its brothers in the HL range, it has characteristic large leaves. This in turn yields high quality feed as the stem to leaf ratio is much higher than other competing varieties. And lastly, yield. We have had numerous farmers commending the variety on its ability to out-yield almost any other throughout the year, with some producers yielding up to 3 tons per hectare in certain parts during the growing season.

If you do not have a situation where you need a salt tolerant variety, you can plant HLS's half-brother HL 9 or the new kid on the block, HL 10. HL 9 has proven to have high yield potential and also features the large leaves that lend to its quality hay making ability. New to the portfolio which is set to cause a stir, is the higher class 10 dormancy HL 10 which will in very cold conditions out-yield HL 9 by about 2-3 tons per hectare per annum.



Charlize

– what a legend!

By PJ Fourie, National Product Development Manager

In other countries around the world, Charlize is named Regent... maybe it should have been called Legend.

Why? Charlize, from Enza Zaden, is celebrating 10 years after its release in 2006.

Enza Zaden is amongst the best onion breeding companies in the world and their varieties dominate the South African market leaving the competition way behind.

History

Since the purchase of Yates vegetable seeds in October 2003, Enza Zaden had a R&D station in Narromine, in the province of New South Wales.

This station works on breeding programmes for onion, cauliflower, pumpkin and lettuce, which are sold locally and internationally.

Besides Australia, breeders are also active in New Zealand. The office in New Zealand forms part of Enza Zaden Australia and is situated in Pukekohe, the most important horticultural area in South Auckland.

An added value of Enza Zaden Australia's breeding programme, is its location in the southern hemisphere, enabling us to grow two generations of various crops annually, which substantially shortens the breeding time.

The home of Charlize started back in the days of the Yates onion breeding programme and ever since Enza Zaden took over Yates they have never looked back, ever improving on every aspect of onion breeding and seed production as well as seed preservation for long term storage. Great thanks to Lewis Lydon, onion crop breeding manager.

Charlize is most definitely a 'work-horse' onion variety that can be planted in an array of locations in its designated time slot... from areas down in the Western/Eastern Cape to as far north as Zambia. Its adaptability and eagerness to produce a good yield under very different climatic conditions, is astonishing for a Short Day onion variety.



Jean Francois Hardouin (left) from Enza Zaden, Brazil and a colleague with a beautiful bunch of Charlize onions.

F1 HYBRID ONION SIRIUS



FEATURES

- Good plant vigour
- Excellent yield potential
- Good skin quality and retention
- Unique sowing slots for a wider planting window

Accumulation of nutrients in leaves, bulbs and plant (leaves + bulbs) of onion **Sirius**

Stages of development	Days after sowing	N	P	K	Ca	Mg	S	B	Cu	Fe	Mn	Zn
Accumulation of nutrients												
4 Leave Stage	69	8,8	1,6	7,2	5,2	1,1	0,6	10	9	160	21	22
7 Leave Stage	93	42,1	8,9	34,6	24,8	6,2	2,3	40	49	730	258	206
9 Leave Stage	101	47,1	10,6	44	32,6	8	4,1	55	62	652	270	131
Class 2	109	65,9	20,1	74	62,9	16,2	6,2	111	241	6849	663	360
Class 3	127	57,9	11,3	110	79,7	15,5	8,4	112	237	2833	1553	460
Class 4	135	87	16,8	96,3	85,5	19,3	8,7	141	200	3102	1156	341
Harvest	140	71	19,4	101,3	86,9	19,4	8,4	155	163	3775	1194	347

TRIAL DATA

SUITABILITY	Mid short day
DAYS TO MATURITY	Northern Regions - 150 days Northern Cape - 170 days Western Cape - 170 days
RECOMMENDED SOWING SLOT	Northern Regions: 1 - 25 Feb and 10 April - 20 May Northern Cape: 1-7 May Western Cape: 15 - 30 April (direct)
BULB SHAPE	Globe
BULB SIZE	70-110mm
STORAGE	2-3 months

For efficient fertilizer management, the knowledge of the nutrient demand and the rate of absorption (also known as the absorption curve) by the crop over the cycle is of paramount importance.

Conclusion

1. The nutrient most accumulated by the onion was the K.
2. Regardless of the cultivar, most of the nutrients are accumulated between the 7th leaf and the presence of class 4 bulbs in the crop.
3. The most absorbed nutrients were K, N, and Ca. The latter two had similar amounts.

DISEASE RESISTANCE

Intermediate resistance to Downy Mildew

By Johan Stassen, Technical Manager

Hygrotech onion successes in the Northern Region

The following onion successes during the past onion season will allow growers to make sound decisions for the 2017 season. These varieties sown in the recommended sowing slots, will minimize risks and in the long term will assure financial benefits to the growers.

Fernanda is one of the few varieties that can yield above 8000 bags in the January/February sowing slots. Two growers have tasted this success by sticking to **Fernanda** (see below). The secret of **Fernanda** success is to ensure that minimum stresses occur during the early growing stages. Sown during February there are not many varieties that can keep up with **Sirius**. This versatile variety can also be sown in April. **Sirius** brought several growers top yields this past season and for many growers in the Polokwane region will be the backbone of their onion programmes.

One of the new varieties in the Hygrotech range, **Chelsea**, has been introduced into the market with good performances in the late March/April sowing slots. **Chelsea** provides growers with a strong root system and high potential yields in these later slots.

Table 1: The attached table indicates the advised sowing slots for the Hygrotech onion range for the Northern Region.

VARIETY	JAN	FEB	MAR	APR	MEI	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Python	■	■										■
Morena	■	■										
Fernanda	■	■	■		■	■	■					
Sirius		■	■	■	■	■	■					
Charlize		■	■	■	■							
Chelsea			■	■	■	■						





Stephen le Roux was specifically excited about this perfect field of Sirius at C&H Kruger Farms North of Polokwane which broke the 9000 bag barrier.



Mr Hennie Du Plessis of the Tom Burke region was especially pleased with this excellent crop of Chelsea of which 8000 bags were marketed. Pieter Vorster from Hygrotech with a bunch of high quality Chelsea onions. Chelsea has shown to be more bolting tolerant than most other varieties in these late slots.



Sirius in the same field at Kruger Farms just after they have been pulled. Note the quality and size uniformity.

Note the size uniformity and quality of Fernanda curing in the soil



FROM ASHES TO A NEW MODERN STATE OF THE ART FACTORY

In the peaceful town of Hanover, Pennsylvania, a fire disaster struck in the middle of the night during June 2015 and destroyed a 10,000m² factory of MILLER CHEMICALS to the ground. The factory was rebuilt on the same footprint from the ground up and started manufacturing and packing almost to the day in June 2016.

Charlie Svec, president of MILLER CHEMICALS and FERTILIZER company and a veteran of more than 50 years in Miller, said that after the shock and disappointment wore off, the challenges with the town council, the insurance companies, building contractors, finding trustworthy and professional toll manufacturers to provide products to customers in the USA and worldwide within 60 days after the fire, were both horrendous and satisfying when MILLER CHEMICALS were up and running in just over a year.

Hygrotech have been the exclusive distributor for MILLER CHEMICALS in Southern Africa for the well-known Nu-Film range of products in their Agricultural Adjuvant portfolio since the company's inception in February 1984.

The next morning after the nightmare, all that was left were melted roof sheets, remnants of destroyed products from packed containers and millions of gallons of water to kill the fire that ran into adjoining fields, agricultural crops and roadways.



The raging fire and bellowing smoke that startled the inhabitants of Hanover, Pennsylvania on the fateful night in June 2015.





Cleared land on which the old 10,000m² factory stood and rebuilt after one year on the exact same footprint.



Habé Roode and Charlie Svec in the new factory during late August 2016.



Manufacturing equipment with kilometres of piping, electrical cables and a massive watering system.



Brand new stainless steel tanks for the manufacturing of the MILLER range of Agricultural Adjuvants and soluble nutrient mixtures.



BIOFUMIGATION:

Are all mustards equal?

"Biofumigation is the beneficial use of green manure crops especially Brassicas that release isothiocyanates chemically similar to methyl isothiocyanate, the active agent from the synthetic fumigant metam sodium, which is used as a substitute for methyl bromide in some systems.

A systematic approach to research into biofumigation, specifically aimed at overcoming a long history of experimentalism, has seen significant recent advances in both basic and applied knowledge"

John N Matthiessen, CSIRO Entomology, Australia

It is well known that not all species used for Biofumigation give satisfactory results and as such most producers opt for Brassicas such as Canola or Rapeseed and more so Mustards. But are all Brassicas and specifically mustards equal? We find it quite often that farmers that have switched over to such advances in pest management as Biofumigation, are often ill informed on what they are planting as a Biofumigation crop. The common misconception is that almost all Brassicas are good Biofumigation crops and there is only one mustard species suited to this practice.

Mustard is in fact a collective name for a series of Brassicas used, under which we actually have three main species that are used for Biofumigation

practices. Firstly we have White or Yellow mustard, *Brassica hirta* or more commonly known as *Sinapis alba*. Then there are the Indian or Oriental mustards, *Brassica juncea*. And lastly the black mustard, *Brassica nigra* which is more commonly used in meal and pellet form rather than as a crop. "Plants in the Brassica family, such as rapeseed, broccoli, cabbage, and mustard, produce compounds called glucosinolates in their roots and shoots. They also produce an enzyme called myrosinase, which is normally separated from the glucosinolates. When the plant cells are damaged by an insect or by a farmer chopping a green manure crop, the glucosinolates and the myrosinase come together. A reaction takes place that produces a mixture of other compounds. Some

of these resulting compounds such as Isothiocyanates (ITC) are toxic to soil fungi, nematodes, and even weed seeds" - *Andy McGuire, Agricultural Systems Educator, WSU*

As such rapeseed, broccoli, cabbage, mustard and even Canola have the ability to suppress said fungi, nematodes and weed seeds, determined by the concentration of the ITC in the plants and to a certain extent the specific parts where these chemicals are concentrated. Thus, one species will have better control over all or certain specific pests or weeds. Some species within the Brassica family will also show variable suppression. Research documented in 2007 with multiple studies thereafter has proven this to be true especially where the afore mention species were pitted against each other. The article titled 'Control of soil borne potato disease using Brassica green manures' (Larkin, Griffin. 2006) found that there were noticeable variation in suppression of various pathogens between Brassica species and even more so in closely related species such as Yellow and Indian mustard. This variation is largely attributed to the concentration of glucosinolates in the plants and also the area of concentration.

For this exercise we will be focusing on the proven higher efficacy of Indian mustard compared to Yellow mustard. In the study chopped leaf material of Indian mustard showed nearly complete inhibition (80-100%)

Tabel 1

Rotation crops evaluated for effects on soilborne potato pathogens and diseases in laboratory, greenhouse, and field trials		
Crop name—cultivar	Scientific name	Relative glucosinolate content
Potato—"Shepody" (GH only ^a)	<i>Solanum tuberosum</i>	None
Oats	<i>Avena sativa</i>	None
Ryegrass—"Lemtal"	<i>Lolium multiflorum</i>	None
Barley	<i>Hordeum vulgare</i>	None
Canola—"Hyola 401"	<i>Brassica napus</i>	Low
Rapeseed—"Dwarf" Essex"	<i>Brassica napus</i>	Moderate
Turnip—"Purple Top"	<i>Brassica rapa</i>	Moderate
Radish (oilseed)—unknown	<i>Raphanus sativa</i>	Moderate
Yellow mustard—"IdaGold"	<i>Sinapis alba</i>	Moderate
Indian mustard—unknown	<i>Brassica juncea</i>	High

^aPotato crop used in place of bare soil (no-crop) control for maintenance of inoculum of *R. solani*. In greenhouse tests only.

Tabel 2

Inhibition of in vitro growth of six soilborne fungal pathogens by volatiles from macerated leaf tissue of different <i>Brassica</i> and other rotation crops						
Crop treatment	% Inhibition (relative to control) ^a					
	<i>R. solani</i>	<i>P. erythro.</i>	<i>Pythium</i>	<i>S. sclero.</i>	<i>F. sambuc.</i>	<i>F. oxysp.</i>
Control (no treatment)	0 e ^b	0 e	0 f	0 d	0 c	0 d
Ryegrass—'Lemtal'	10.5 cd	14.1 d	10.0 de	12.5 c	2.7 c	0 d
Barley	30.6 b	19.7 d	17.9 b	0 d	37.5 b	21.6 b
Canola—'Hyola 401'	10.2 d	45.8 b	11.9 cd	22.5 b	22.8 bc	8.0 c
Rapeseed—'Dwarf Essex'	11.5 cd	40.4 bc	15.0 bc	20.4 b	33.7 b	8.2 c
Yellow mustard — 'Idagold'	13.6 cd	25.9 cd	6.2 e	23.7 b	31.3 b	8.4 c
Turnip—'Purple Top'	18.8 c	46.0 b	14.1 bc	18.6 bc	31.7 b	17.8 b
Indian mustard	100 a	100 a	100 a	90.2 a	80.2 a	73.2 a

^aRadial growth on agar media was measured at 24, 48, and 72 h after addition of leaf tissue. Treatments were compared with control growth and percent inhibition determined ((control-treatment)/control*100). *R. solani* = *Rhizoctonia solani*, causal agent of stem canker and black scurf; *P. erythro.* = *Phytophthora erythroseptica*, causal agent of pink rot; *P. ultimum* = *Pythium ultimum*, causal agent of Pythium leak; *S. sclero.* = *Sclerotinia sclerotiorum*, causal agent of white mold; *F. sambuc.* = *Fusarium sambucinum*, causal agent of Fusarium dry rot; *F. oxysp.* = *Fusarium oxysporum*, causal agent of Fusarium wilt.

^bMeans within each column followed by the same letter are not significantly different according to Fisher's protected least significant difference test at *P* = 0.05. Means represent the average combined values for two experiments.

of *Rhizoctonia solani*, *Phytophthora erythroseptica*, *Pythium ultimum*, *Sclerotinia sclerotiorum*, and *Fusarium sambucinum*. Overall, Indian mustard was the most effective control measure against powdery scab and common scab in potatoes than any of the other controls.

The trial also concluded that of all the *Brassica* species, Indian mustard had the highest relative glucosinolate content which is the precursor of the pathogen suppressing ITC even compared to a close relative such as Yellow mustard.

The most interesting findings were the percentage control of macerated leaf tissue from Indian mustard compared to that of Yellow mustard. Indian Mustard had 100 % control of *Rhizoctonia solani* (Stem canker and Black scurf) *Phytophthora erythroseptica* (Pink rot) and *Pythium*



ultimum (Pythium leak), whereas Yellow mustard only showed 13.6, 25.9 and 6.2 % control. Indian mustard also showed significant suppression of *Sclerotinia sclerotiorum* (White mould) 90.2 %, *Fusarium sambucinum* (Fusarium dry rot) 80.2%, and *Fusarium oxysporum* (Fusarium wilt) 73.2%, compared to Yellow mustard's 23.7, 31.3 and 8.4%. In fact, Yellow mustard's ability to suppress said pathogens was even inferior to crops not known for their Biofumigation properties such as common Barley and that "Indian mustard provided the overall lowest incidence and greatest disease reduction"

This fact was attributed to *Brassica juncea's* (Indian mustard) very high level of glucosinolate content, and for having the most biologically active form of ITC. It was confirmed that Indian mustard was in some cases up to seven times more effective in controlling certain soil pathogens than other *Brassicaceae*.

Another advantage that Indian mustard lends to Biofumigation practices, is the crops ability to stimulate beneficial soil micro-organism populations. This is due to the fact that certain non-pathogenic species are less susceptible to ITC, which in turn gives such organism the distinct advantage over suppressed pathogens in a treated soil profile.

The data was also able to confirm that Indian mustard alone had the ability to give similar suppression results compared to standard chemical control

practices in the case of Powdery scab in potatoes. A pathogen known for its difficulty to control through chemical amendments, whilst still adding significant volumes of organic material and other soil structural, chemical and biological advantages which such chemical practices, cannot.

Larkin and Griffin were able to clearly illustrate from In vitro and field trials that there are variable control between various *Brassica* and other crops ability to biologically control a variety of soil pathogens. Even within species such as mustards there is a significant difference in suppression of said pathogens. The ultimate take home fact is that when selecting Biofumigation crops, not all are equal. Indian or Oriental mustards such as blends distributed by Hygrotech, are a far superior options. Hygrotech has distributed, with great success, the Caliente brand of Indian mustard blends which have been specifically bred and selected in the United States for the highest concentrations of ITC and pathogen control. This small seeded crop can easily be seeded at 10-12 kg/ha with a variety of planters. When fertilized, managed, and incorporated correctly, similar results can be obtained under South African conditions.

For more information on Cover and Biofumigation crops such as *Brassica juncea* blend Caliente please contact J.J. de Klerk on 072 376 9706 or email voerenweiding@hygrotech.co.za

Zinc and Plant Nutrition

By DC Coetzee, Technical Advisor - Fertachem

Zinc is important in the human diet as it plays a basic part in cellular functions of all living organisms and to improve the human immune system. The FAO estimate that about 30% of the world's human population are living on a zinc deficient diet. The most important sources of zinc are food that is high in zinc, namely beef, pork, chicken, cereals, nuts, and dairy products. Deficient zinc in food relates to zinc poor soils which are producing zinc deficient crops. This happens all over the world and the estimate is that more than a third of the world crop producing soils are zinc deficient. In a recent local survey in which over 2000 soil samples were analysed, it was found that almost half showed deficient zinc content.

Zinc is an essential nutrient element, without which a plant cannot complete its normal life cycle. Zinc plays a catalytic, structural as well as regulatory role in plant metabolism:

- Participates in the synthesis of tryptophan - the precursor to auxins, specifically indole acetic acid (IAA). IAA is one of the plant hormones involved in various aspects of growth and development, such as stem elongation, apical dominance and root formation.
- Zinc containing enzymes – an inorganic catalyst (usually a protein) that accelerates specific chemical reactions (metabolism) by lowering the activation energy required for that reaction. In biological systems zinc is the only metal that is present in all the enzyme classes, namely oxidoreductases, transferases, hydrolases, lyases,

isomerases and ligases. Some of the more important enzymes reliant on zinc are:

- o Alcohol dehydrogenase enzyme which catalyses the reduction of pyruvate (the energy rich product of glycolysis) to acetaldehyde to ethanol (fermentation) in the absence of oxygen (anaerobic conditions such as waterlogged soil) in the cellular respiration (energy releasing) process.
- o Carbonic anhydrase catalyses the hydration of CO_2 : $\text{CO}_2 + \text{H}_2\text{O} \leftrightarrow \text{HCO}_3^- + \text{H}^+$
- o CuZn Superoxide Dismutase, where zinc is part of the structure of the enzyme, is directly involved in the detoxification of the radical O_2^- oxidant.
- o Other enzymes include: alkaline phosphatase; phospholipase; carboxypeptidase and RNA polymerase.

- Zinc activated enzymes, including dehydrogenases, aldolases, isomerases, transphosphorylases as well as RNA and DNA polymerases.
- Protein synthesis is directly related to the zinc concentration in cell sap. Zinc is a structural component of ribosomes and essential for their structural integrity.
- Many of the zinc dependant enzymes are involved in carbohydrate metabolism. Where zinc is in short supply, sugars and starch tend to build up. The accumulation of carbohydrates in zinc deficient plant leaves increases with light intensity, at least partly due to an expression of impaired new growth. These symptoms are rarely visible.
- Membrane integrity suffers in zinc deficient plants. It has been proved that membrane permeability increased in zinc deficient plants due to higher



Maize plants with severe zinc deficiency in the foreground, with healthier plants (planted at the same time) in the background.

rates of O_2^- and the plant's ability to protect itself from uptake of harmful substances.

- Lipid peroxidation manifest itself as necrosis and chlorosis due to the oxidative stress brought about by higher generation of reactive oxygen species and an impaired detoxification system in zinc deficient plants

Many authors observed zinc deficiency to be one of the major constraints in world food production. Recently reports of zinc deficiency have increased because high-yielding plant varieties (cultivars) and intensive cultivation remove more zinc with every harvest that can be replaced with natural zinc yielding processes.

Zinc deficiency results in stunted growth, reduced protein synthesis and negatively affects the root development. Zinc deficiency affects the water and nutrient absorption from the soil thus also affecting the flowering and fruiting process of the affected plant. The net result is a reduction in the quantity and quality of the harvest.

Visual symptoms of zinc deficiency are relative easy to identify and useful to recognise acute zinc deficiency, but not for marginal or hidden deficiencies. Some of the most common symptoms of zinc deficiency are:

- Stunted growth with shortened internodes and petioles – visible as thin and short stems
- Small malformed leaves (little leaf syndrome) resulting in the rosette symptom in the early growth stage of dicots and the fan shaped stems in monocots
- Symptoms are first observed on young leaves as zinc is relative immobile when deficient. These leaves remain small, cup upward and develop interveinal chlorosis and necrotic spots on the upper leaf surfaces which later join each other to form brown necrotic and brittle spots. Necrosis is normally more noticeable on middle aged leaves which eventually wilt, bend and collapse.

Following a selected few diseases suppressed by the presence of sufficient zinc:

Disease	Pathogen	Host
Rhizoctonia root rot	<i>Rhizoctonia solani</i>	Wheat
Take-all	<i>Gaeumannomyces graminis</i>	Wheat
Smut	<i>Ustilago maydis</i>	Maize
Powdery scab	<i>Spongopora subterranea</i>	Potato
Phytophthora root rot	<i>Phytophthora megasperma</i>	Lucern (Alfalfa)

As can expected there will be diseases and Pathotoxins that will thrive on excess zinc presence. Following a selected few:

Disease/ Pathotoxin	Pathogen	Host
Mildew	<i>Erysiphe graminis</i>	Wheat
Aflatoxins	<i>Aspergillus flavus</i> ; <i>A. parasiticus</i>	Various
Vascular wilt	<i>Fusarium oxysporum</i>	Various

It has been proven that sufficient levels of zinc do have a suppressing effect on the development of certain diseases. Zinc plays an integral part of the plant's defence against UV damage and reactive oxygen species. Zinc deficiency impairs the production the plant's defence pathways against fungal and bacterial phytopathogens.

The above effect on diseases by zinc has an important impact on nutritional management decisions.

The availability of zinc for uptake by plants in soil are affected by various factors, which can broadly be classified as sources of zinc in the soil, interaction with other elements and abiotic factors. Zinc is taken up by plants in the dissolved- or cation form, namely Zn^{2+} .

The most important source in soil is the zinc content of the parent material. Different types of rocks differ in zinc content and that is carried over to the soil forming from the weathering of those rocks. The second source is from the decomposition of soil organic material. Zinc and other nutrient rtilizers. elements are set free as the structure of SOM breaks down. The third and most likely the most important source of zinc are fertilizers. The most common forms of zinc fertilizer used are zinc oxide, zinc phosphate, zinc sulphate, zinc nitrate and zinc chelates. While zinc oxide and zinc-mono-phosphate are insoluble in water and only dissolved to Zn^{2+} cations by organic acids;

zinc-bi-phosphate, zinc sulphate and zinc nitrate are water soluble. Water soluble zinc salts and chelates are quickly available as Zn^{2+} for uptake by roots and leaves of the target plants. Foliar application of these soluble salts and chelates are an easy, fast and economical way to solve zinc deficiency problems on all crops.

Availability of zinc for uptake by plants from soil is influenced by the relative high levels of phosphorous (P) which cause the so-called "P-induced-Zn-deficiency". The most common form of P in soil is orthophosphate (H_2PO_4) and both $H_2PO_4^-$ and HPO_4^{2-} forms are taken up by higher plants. The HPO_4^{2-} specie readily binds with Zn^{2+} to form a water insoluble salt molecule. This molecule can only be dissolved by organic acids which are dependent on the organic matter content of the soil. In sandy soils with low SOM and high pH-values, zinc will most likely be sequestered as insoluble phosphate salts. It is found that zinc concentration in the grain of wheat was reduced by P application and is mainly attributed to the "dilution" effect – where the growth of the plant is faster than the uptake of Zn^{2+} by the roots, resulting in an under supply and distribution of zinc through the plant. A related phenomena is that although zinc levels in the plant remain constant, the symptoms of zinc deficiency increase as the concentration of P increases and

Hygrotech manufacture and market several zinc containing products, hence a short list:

Product	Zinc content	Zinc content
Zinc Nitrate	110 g/l	89 g/kg
Hygrofert Zn 14 (EDTA Chelated)		140 g/kg
Hygroboost Flo	50 g/l	38.5 g/kg
Maize Plus	684 mg/l	580 mg/kg
NitroCane Plus	510 mg/l	378 mg/kg
Nitrospray Plus	510 mg/l	383 mg/kg
Dripfeed		350 mg/kg
Folifeed		360 mg/kg
Hygroponic		149 mg/kg
Hyperfeed		500 mg/kg
Freegrow	60.15 mg/l	58 mg/kg
Spoorspray 30		146 g/kg
Hygrofert		224 mg/kg

it might be that increased level of P negatively influences the solubility and mobility of zinc in the plant.

Soil acidity/alkalinity has a marked influence on the availability of zinc. It is well known that the availability of zinc decreases rapidly at pH-values higher than 7. For every increase in pH-value of 1, decreases the availability of zinc tenfold. Zinc availability is at best in mild acidic soils (pH-values of 5.5 to 6.5).

While decomposing soil organic matter is an important source of zinc, too high SOM levels (peat and muck) can also sequester zinc – most likely as a result of complexing with solid state humin. It is known that fulvic acid can act as a chelate for cations which will increase the mobility and thus the availability of Zn. Adequate SOM-levels increase the Cation Exchange Capacity and adsorb more

zinc and keep it available for plants.

Zinc, specifically in its cation form Zn^{2+} competes with other metals in their cation forms for a place on the Cation Exchange Sites. Divalent cations such as Zn^{2+} , Ca^{2+} and Mg^{2+} will have preference over monovalent cations such as K^{+} , H^{+} and Na^{+} . The concentrations of the cations in the soil solution might have an even bigger effect on the composition on the exchange sites. As a general rule Ca^{2+} constitutes 65% of the cations on the exchange sites, Mg^{2+} 18%, K^{+} 10%, Na^{+} 2% and H^{+} 5%, leaving very little room for the micronutrients in cation form, being Zn, Cu, Fe and Mn. That is apart from the fact that the concentrations of Ca and Mg have a marked influence on the alkalinity/ acidity (pH) of the soil and thus also influence the availability of zinc.

Abiotic factors like soil moisture

content, soil and ambient temperature influence the growth of the plant and thus the ability to take up nutrients such as zinc.

Consensus is that zinc content of soil should be between 3 mg/kg and 6 mg/kg and that the zinc to phosphorous ratio should not exceed 1Zn:15P. Please note that the norms for soil analyses done by Brookside Laboratories differ from and is usually higher than those for local laboratories. However your soil analysis is still the best tool to determine zinc fertilisation for your crops. Consult a qualified agronomist or soil scientist when in doubt (look out for accreditation with the FSSA or PrSciNat).

Please note that abovementioned products contain other elements too and that the composition of these products determines their applications. Consult your Hygrotech representative or -agent.

Because a long list of references were used the two most used references are listed:

1. Functions of Nutrients:
Micronutrients by Broadley M., Brown P., Cakmak I., Rengel Z. & Zhao F. in Marschner, P.(Ed), 2012. *Mineral Nutrition of Higher Plants*, 3rd Ed. Academic Press (Elsevier) San Diego.
2. Havlin J.L., Beaton J.D., Tisdale S.L. & Nelson W.L. 2005. *Soil Fertility and fertilizers* 7th Ed. Pearson/Prentice Hall, Upper Saddle River, New Jersey.

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Easy boerewors pasta with tomato and basil

Ingredients

- 400gms of your favourite boerewors
- 2 cups of halved cherry tomatoes
- 1/2 cup of tomato passata / jarred tomato sauce
- a fistful of fresh basil leaves – roughly chopped
- a pinch – 1/2 t of smoked chilli flakes / chilli flakes if you felt like adding some heat
- 200 – 250g of linguini pasta of your choice
- Parmesan to serve

Instructions

Slice the sausage up into smallish discs and fry in a non stick pan until the meat starts going brown and is just cooked through. Remove the meat and drain on paper towel as a lot of fat is rendered out. Discard the fat and return the pan to the heat which is now just coated in a thin layer of the leftover fat, and flash cook the tomatoes until heated through.

Add the sausage back to the pan with the basil, chilli and passata and heat through. Check seasoning and add salt and pepper.

The whole process takes a matter of minutes, so make sure you start cooking your pasta before. Serve with pasta and a grating of fresh Parmesan cheese.



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