

September 2017

The spawn run

Journal of the South African Mushroom Farmers Association

CONTENTS:

From the Editor page 2

SAMFA Conference 2017 page 3

The Role of Microbiomes and
Potential Use in Mushroom
Disease Control
Dr Nazareth Siyom
& Prof Lise Korsten page 5

The Mushroom Calendar page 8

MUSHDrOPS Diagnostic
Identification Service page 9

SAMFA PR Highlights
Riana Greenblo page 12

20 Questions
with James Crank page 14

FROM THE EDITOR

It is spring 2017, and no, you were not left off the mailing list for the previous two issues of the Spawn Run. Following my resignation and some circumstances beyond anyone's control, March and June did not see any issues being published. For those readers who missed the quarterly dose of mushroom news, we apologise and hope to continue as usual from hereon. Having been approached by the SAMFA committee and following some persuasion and thought I am resuming the role of editor of the Spawn Run. As always I would like to appeal to any parties interested in contributing to or making suggestions for the publication to contact me. The Spawn Run is a tool for the industry and needs to be developed as such to deliver benefit to its readers.

This issues plays a bit of catch up so we recap on SAMFA marketing and the SAMFA conference held earlier this year and continue to get to know the people of the industry.

The University of Pretoria delivers yet another interesting contribution on microbiomes which I think is going to be the subject of much research in the future, not only in agriculture but also in the field of medical science and human health.

When one considers that every facet of mushroom production, from substrate to fruit, relies on microbial action and interaction, it is not unreasonable to assume that these microbiomes are the key to fully understanding and maximizing this amazing process.

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the
spawn
run

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SAMFA Conference 2017

- an Overview

By Hannes Rossouw, Reese Mushrooms

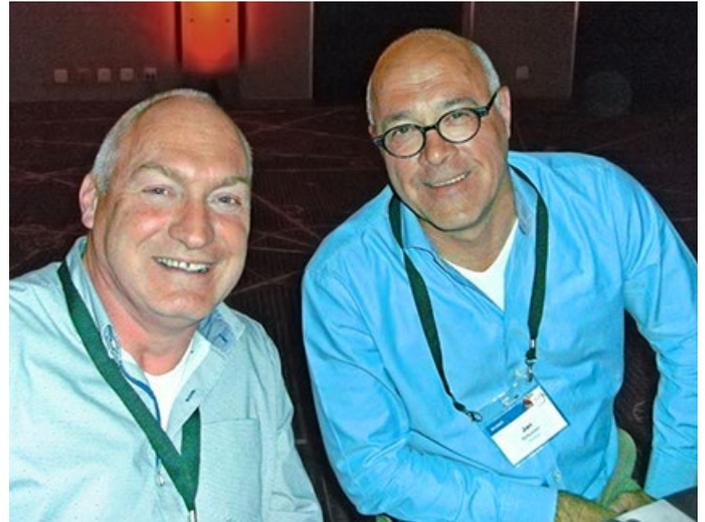
A mushroom conference in South Africa is not only a conference, but also a bit of a family get together. This year was no different. Because of ISMS last year, we did not have our local conference where one gets to interact with many of the "small farm" growers and owners.

The venue for the 2017 SAMFA Conference on 16/05/2017 was well chosen. Close to O. R. Tambo Airport, making it easy for delegates who travelled by plane, to attend.

The programme for the day was packed and apart from the normal welcomes, the following lectures and discussions, in my humble opinion, I enjoyed the most:

1. **Panel discussion on composting.** This was a first for me and I enjoyed it very much. I feel next time everyone should sit closer to the panel and we should be more open and relaxed. Local input was appreciated.
2. **Lecture on legal responsibilities of running a mushroom farm.** Very informative and necessary, especially seen in the light of what happened at Ocean Mushrooms.

3. **The lecture given by Mel Meyer on applying innovation to basics of mushroom growing was almost my highlight of the day.** It confirmed the fact that we reside in Africa and that Africa has its own ways. How people grow mushrooms from a "pliers and wire" built farm and the creativity of mankind was an eye opener.



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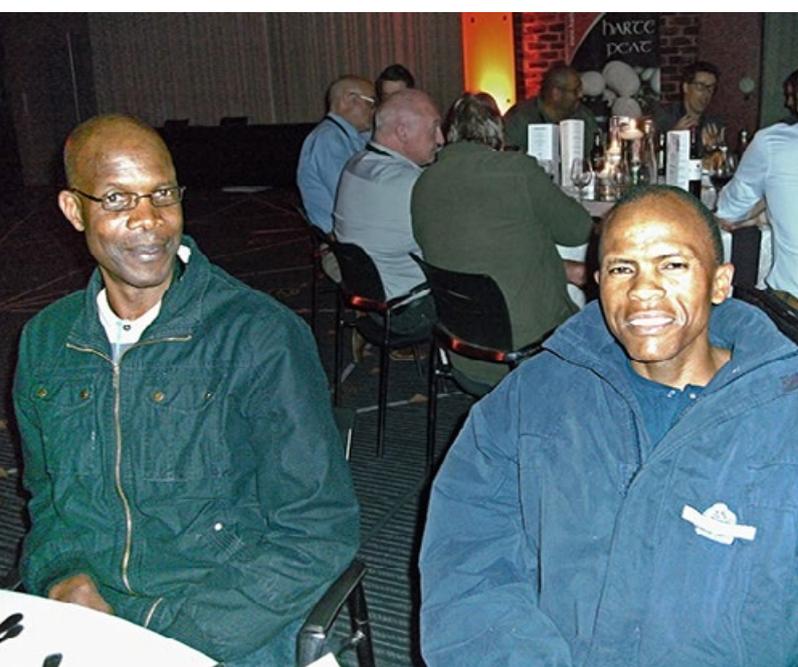


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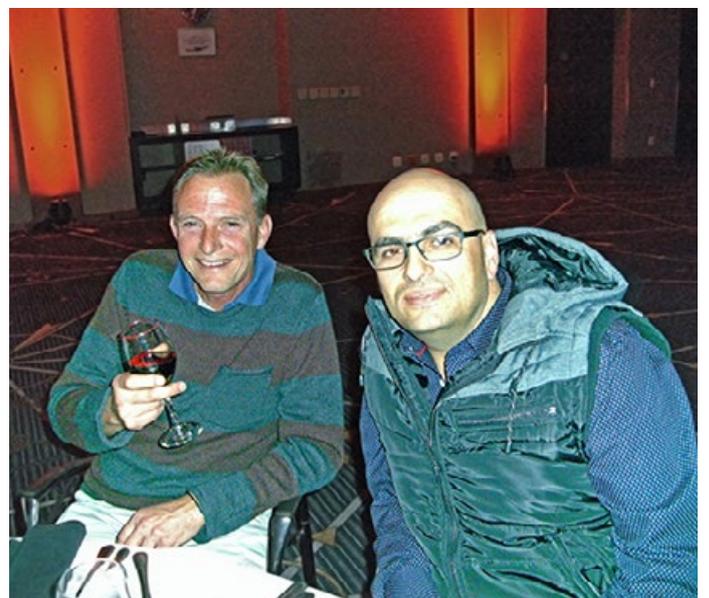


4. It was good to note that part of the levies we pay on spawn, seem to be very well applied by **SAMFA Marketing**. Knowing Ross, I never expected less.
5. The same applies to the **UP SAMFA Research Project** and I would urge all farms to make use of their offer as it will really give you more insight of what is truly going on your farm. The database being built up with regard to disease and pathogens is also inspiring and good to note. Thanks again Ross and the team at UP.
6. **Mr Dennis Dykes of Nedbank gave a very informative speech about recent economic and political developments in SA. I Wonder if this was before all the Gupta e-mails became known??**
7. I left this until last: **Mr. Jan Gielen of Holland, gave two lectures on managing evaporation, quality and climate aspects in the growing rooms. Mr. Gielen is truly a remarkable specialist in this field. When he talked about the Mollier diagram he made me realise that after 30 years in the industry, I have so much to learn. This was a bit too much for me and I would love to see the younger generations study these technical principles to understand every word in a lecture like this. Please study it and understand it; I was in the dark.**

As always, there was an AGM after the conference, and I think the committee was re-elected, seeing that they do such a great job. **Thank you!**

At the end of the day, we had a stunning "kuier" and supper. We met up with old friends, missed a few from the Cape and befriended the new ones from Limpopo. We enjoyed the "golden oldies" entertainers and the wine was flowing! Hope to see you all again next year, although I understand there are to be a few retirements.

We wish everybody well and may you produce plenty high quality mushrooms.



The Role of Microbiomes and Potential Use in Mushroom Disease Control

University of Pretoria, Department of Plant and Soil Sciences,
Plant Pathology Laboratories, Pretoria, Gauteng, South Africa

Introduction

Microbiome is a term used to collectively describe the community of microorganisms, alternatively also called microbes or microbiota, and their genes in a specific environment. The environments inhabited by these microorganisms include soil, plant, water, air, human body and other living and non-living entities. Within these entities, different sites or parts are generally characterised by distinct microbiomes. In this article we will focus on soil microbiomes in agriculture and mushroom disease control.

Soil microbiome study

Previous techniques used to explore soil microbes required growth on artificial media in the laboratory or in the soil by adding nutrients to the soil (Bae *et al.*, 1972). The use of artificial medium or nutrient additions doesn't depict the representative microbial communities in the soil. The reason for this is that the majority of microbes do not grow on artificial media and do not respond to the addition of nutrients. To the contrary, nutrient enrichment causes quick growth of certain groups of microbes and disturbs the climax community and ecological balance in the soil. In the 1990's, molecular techniques which are based on DNA fingerprinting of microorganisms were introduced which circumvent laboratory growth of microorganisms (Muyzer *et al.*, 1993; Øvereås *et al.*, 1997). Consequently, researchers were able to study microbial communities by extracting their DNA directly from the soil or other environments without the need to enrich or grow the organisms in the laboratory. Using these molecular techniques, researchers could demonstrate a more representative microbial base. Presently, molecular techniques have advanced to the extent that 'next generation sequencing (NGS)' techniques can be used to study complex community structures (Mardis, 2008; Kameshwar and Qin, 2016). These techniques have enabled researchers to explore microbial communities in a much greater magnitude than before. With the wide use of NGS techniques for microbial community study in different environments including soil, the term microbiome is now commonly used to describe the relevant microbial communities and their associated genes.

Microbiomes in agriculture

Soil, in its natural state, harbours a diversity of microbes which play a crucial role in maintaining a healthy and functional ecological system. Microorganisms are vital for agricultural soil quality and are primarily associated with nutrient availability (Singh *et al.*, 1989; Lipson *et al.*,

1999; Burger and Jackson, 2003; Laungani and Knops, 2012) for vigorous plant growth and plant disease suppression (Lemanceau *et al.*, 1995; Latour *et al.*, 1996).

Consequently, agricultural soils can be exposed to selected microorganisms, such as bacteria and fungi to stimulate plant growth, obtain disease control by inhibition of plant pathogens, improve soil structure and remove contaminants from polluted soils (VanVeen *et al.*, 1997).

Microbiome and disease suppression characteristic of soils

Disease suppressive soils are characterised by conditions that do not allow disease to develop. This occurs in the soil as a result of microbial activities that negatively impact on pathogenic populations. Disease suppression by microbes can be achieved by four main mechanisms, namely, competition for food source, production of antibiotics, parasitism and induction of resistance in the host against the pathogen (Hoitink and Boehm, 1999).

The natural state of disease suppression in soils can be disturbed by different agricultural activities which include chemical applications. Chemicals applied to control different agricultural diseases interfere with the microbial communities and their function in the soil habitat, besides controlling the targeted pathogen (Katan, 2017). This interference alters the natural balancing effect of the microbial communities on each other. Hence, in the absence of some members of a healthy microbiome consortium, pathogenic species may prevail and cause disease. Therefore, disease suppression of soils should be maintained by minimal use of chemicals and rather the implementation of integrated disease management strategies. Furthermore, this essential characteristic of soil or growing media should be manipulated for sustainable disease control in different agricultural systems.

Microbiomes in soil amendment for disease control

In agriculture, soil amendment with composted organic matter has long been practiced (Hoitink *et al.*, 1997). Organic amendment was practiced to enhance plant growth and to control plant diseases in agriculture (Hoitink *et al.*, 1997). The effect of the amendment on plants is mainly related to its microbiological properties (Bonanomi *et al.*, 2010; Noble and Coventry, 2005).

Composted organic matter harbours a great diversity of microorganisms or natural microbiomes that contribute

the role of microbiomes and

to controlling plant pathogens. However, it is reported that in reality, compost microbes that are known to be involved in disease control are not diverse enough for broad spectrum plant disease suppression (Hoitink and Boehm, 1999). Therefore, understanding the complex microbial dynamics responsible for these complex interactions is vital for developing consistent control strategies via microbiome manipulation.

Biological control of mushroom diseases and the potential of microbiome approach

There are several reports on control of different mushroom disease using beneficial microorganisms. Microorganisms that have the ability to control disease are called biocontrol agents. Most of these biocontrol agents are isolated single species of bacteria and fungi or their combinations. Commonly reported bacteria exhibiting biocontrol potential against fungal mushroom diseases belong to *Bacillus* and *Pseudomonas* species (Bhatt and Singh, 2000; Velazquez-Cedeno *et al.*, 2008; Berendsen *et al.*, 2012; Tajalipour *et al.*, 2014). Bhatt and Singh (2000) reported five unidentified bacterial isolates that showed control against several fungi associated with white button mushroom diseases including wet bubble, green mould and dry bubble caused by *Mycogone perniciosa*, *Trichoderma* sp. and *Lecanicillium fungicola* respectively. Singh and co-workers (2000) also reported fluorescent pseudomonads that showed control on *L. fungicola* and *M. perniciosa*. On another note, a *Bacillus* species, *Paenibacillus polymyxa*, inhibited growth of *Trichoderma harzianum*, the fungal pathogen of *Pleurotus ostreatus* and induced resistance in the mushroom (Velazquez-Cedeno *et al.*, 2008). Berendsen and colleagues (2012) isolated pseudomonad bacteria from colonised casing and tested for antagonism against *L. fungicola*. About one third of the bacterial isolates inhibited invitro growth of the pathogen. However, disease suppression in commercial mushroom growing could not be achieved. Other researchers isolated bacteria from compost, casing and mushroom caps and screened these bacteria against the causal agent of brown blotch disease of button mushrooms, *Pseudomonas tolaasii* (Tajalipour *et al.*, 2014). These researchers found that three *Pseudomonas* species: *P. putida*, *P. reactants*, *P. fluorescens* and *Bacillus subtilis* exhibited significant control of brown blotch disease. Mwangi and colleagues (2017) have reported that a *Bacillus* species, *B. amyloliquefaciens* caused significant inhibition on the growth of two *Trichoderma* pathogens of oyster mushrooms, *T. harzianum* and *T. asperellum*.

Biocontrol is generally preferred over chemical control of diseases in agriculture. However, developing a consistent biocontrol product that provides effective disease control is an ongoing challenge. One of the challenges with a single isolate biocontrol agent is poor establishment of the organism in the soil or in practical agricultural growing environments. Unsuccessful establishment

of biocontrol agents in the soil for instance is due to the complex nature of this environment, which entails biological, chemical and physical factors (VanVeen *et al.*, 1997; Knudsen and Dandurand, 2014).

In resolving the above challenge, and to achieve an effective mushroom disease control strategy using a biological product, the microbiome approach should be considered. In the medical field, microbiomes are being explored to combat different human health problems. For instance, gut microbiomes from healthy donors were transferred to patients with gastro-intestinal diseases (Gopal *et al.*, 2013) and showed successful alleviation of symptoms. It has been previously proposed by Gopal and colleagues (2013) that microbiome transfers can be successful in agricultural disease management strategies. Therefore, the search for effective disease control measures in mushroom production systems should include a microbiome approach.

The mushroom research team at the University of Pretoria, funded by the South African Mushroom Farmers Association (SAMFA), is currently working on a project that focuses on the potential use of microbiomes in mushroom disease control.

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Mushroom Short Course
24th - 26th September 2017
Kennett Square,
Pennsylvania, USA*

*The 9th International
Medicinal Mushrooms
Conference (IMMC9)
24th - 28th September 2017,
Palermo, Italy
www.immc9.com*

*Delphy Mushrooms Short Course,
Composting and Tunnel
Management
25th - 29th September 2017,
Horst, The Netherlands,
mushrooms@delphy.nl
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mushrooms@delphy.nl*

*Delphy Mushrooms Short Course
Growing Edible Mushrooms:
Shiitake - Oyster Pleurotus -
Eryngii - Nameko - Maitake)
3 - 6 October 2017,
Horst, The Netherlands
www.delphy.nl/en*

*The 11th Chinese
Mushroom Days
16th - 19th November 2017,
Zhangzhou, China
Mr ZiQiang Liu or
Mr Yadong Huang
mushroomdays@hotmail.com*

*Master class Mushroom
Growing & Composting
27th November -
2nd December 2017,
Mushroom Office, Horst,
The Netherlands
www.mushroomoffice.com*

*The 9th International Conference
on Mushroom Biology and
Mushroom Products
(ICMBMP9)
12th - 15th November 2018,
Shanghai, China*

**To ensure that your event
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MUSHDrOPS

New Diagnostic Identification Service and Call for Isolates

One of the projects funded by SAMFA is **MUSHDrOPS**, a Mushroom Disease Outbreak Prevention Service, operated by the research team at the Plant Pathology Laboratories, Department of Plant Science, University of Pretoria.

During the past few years SAMFA members have been enjoying at least one free visit from one of the research teams to demonstrate the technology and the benefit of monitoring the disease level on a farm. The main benefit is that should a disease be detected, the farmer can address the infection area quickly prior to the disease manifesting itself in crop losses.

SELF-PAID ANALYSIS SERVICES are now on offer for disease identification or swab analysis depending on the requirement. These can be used as follows:

1. If you had a troublesome area identified in your MUSHDrOPS, once you have sufficiently cleaned/treated, you can re swab and send the swab in for analysis to confirm that you have eradicated the threat, rather than waiting a year until your next MUSHDrOPS.
2. Perhaps you know your troublesome areas, then you can swab on a quarterly basis and send swabs for analysis and identification, making sure that you keep disease at bay. This is a great preventative measure.
3. If you want to identify a specific disease, then these samples can be sent in to, for example, identify *Trichoderma* to species level.
4. Remember that mushrooms, surfaces, substrate or casing can be analysed / swabbed.

And yes it is easy: send the samples to Sylvan, who will arrange delivery to the University. The turnaround time has been set at 10 working days from UP's receipt.

Depending on the techniques required for positive identification, the cost will be between R 1 000 and R 1 200 per sample. Send a request for service to **Nazareth Siyoum**, e-mail nazareth@tuks.co.za or mobile number: **072 783 0518** and a quote will be submitted to you. SAMFA will invoice you and once payment is made and the analysis completed, the results will be sent to you.

Mushroom Disease Sampling Kits will be sent, free of charge, to all the SAMFA member farms in November 2017 with your spawn delivery. Look out for these



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MUSHDROPS

kits as they contain the equipment required to take your own samples, as well as to build on our isolates.

In order to facilitate the research and to build up the culture collection, we are in desperate need of disease **ISOLATES**, indicator and / or competitor moulds, as well as pathogens. Various and fresh isolates (even of fungi that are already in the collection) from different regions are required.

The Mushroom Sampling Kit can be used for collecting and packaging samples of contaminated mushrooms, casing or compost. Please also send to Sylvan. These will not be charged for, but you won't receive information on them as they will be added to our collection. For every 3 isolates sent through in a 12-month period, one free plating and culture isolation will be conducted free of charge.



Mushroom Pathogen Isolation (MPI) Kit, with equipment needed for sampling

Collaboration between mushroom research programmes at Penn State University and University of Pretoria

The UP Mushroom Team received Prof Carolee Bull from Penn State University Mushroom research centre on the 19th of January to set up a mushroom biome collaborative research programme. In this project the two Universities will share expertise in methodology and compare the microbial flora of mushrooms during production. As a follow up visit, Prof Lise Korsten and Dr Nazareth Siyoun, from the UP mushroom research team is going to Penn State University and attend the 59th Annual Mushroom Short Course in Kennett Square from the 20th to 30th of September, 2017.

Prof Carolee Bull & Prof Lise Korsten



Ms Zama Zulu, Dr Nazareth Siyoun, Prof Lise Korsten, Dr Noncy Gomba, Ms Minah Molomo



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SAMFA PR Highlights: February to August 2017

Riana Greenblo

Riana Greenblo Communications

POWER OF PINK 2016 CAMPAIGN

Supports. Restores. Dignifies

There was much excitement on February 3, 2017 when SAMFA, Pick n Pay and Thermopac announced that the 2016 campaign raised an impressive R465 000 for Reach4Recovery's Ditto Prosthesis project. All money raised from the annual Power of Pink campaign goes to purchase silicone prostheses for financially disadvantaged women. It is gratifying to know that our campaign changed the lives of 535 women during 2016.

We are also delighted to report that the cheque handover event generated a massive R596,580 in media coverage. This represents a return on investment of 1:14.



DUDE FOOD CAMPAIGN

Why men need mushrooms

Even though research continues to indicate that nutrient-rich, delicious mushrooms are potential allies in the fight against obesity, heart attacks and prostate cancer, three of the major health risks for men, they don't always get the respect they deserve. The contemporary theme of the Dude Food campaign has a specific appeal to Millennials – "the next great generation" and a major target market for mushrooms.








24 February 2017
Nationally all editions
Circulation: 50 775

Power of Pink gives hope

Chanche and Nikita

essential part of beating breast cancer. [The association], Pick n Pay and Thermopac proudly partnered with Reach for Recovery's Ditto project to offer the final empowering step in cancer treatment for thousands of South African women." All the money raised goes towards buying silicone prostheses for disadvantaged women. Reach for Recovery bought prostheses at an average price of R748 per unit, and recipients made an R80 donation to cover the administrative costs. Reach for Recovery board chairperson, Stephné Jacobs said, "The overall effect is a sense of recovery with self-esteem, dignity and confidence restored. It is a gift of hope that helps every survivor to move on from a negative experience and start enjoying life to the full again."

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a, Pick n Pay and...
Reach for Recovery raise funds for underprivileged women who've had mastectomies. During October, all the mushroom punnets in Pick n Pay go pink. For every punnet sold, Pick n Pay and the association donate R1 to Reach for Recovery. Ross Richardson, the association's chairperson said, "Thousands of rands are dedicated annually to breast cancer research. "We sincerely applaud that initiative because it is an



Reach for Recovery's management board chairperson, Stephné Jacobs, with the cheque for Reach for Recovery.

MushroomsSA
Published by Kia Moraka (7) · 1 June · €

So you've always thought the 80-90% water weight of mushrooms is a bad thing? Well, we're happy to tell you it isn't! That water content makes you feel fuller for longer!

Mushrooms are also a good source of protein, are high in fibre, and packed with B-vitamins, minerals and antioxidants not always present in vegetables. Bonus!

#dudefood #RealMenEatMushrooms #mushroomlove #vitaminb #antioxidants #highfibrefoods

MushroomsSA
Published by Kia Moraka (7) · 2 June · €

Mushrooms are a good source of potassium, a powerful mineral that has been shown to help lower the risk of heart disease and reduce high blood pressure. So, be kind to your ticker and add mushrooms to your shopping basket every day.

And if you buy a punnet with the Dude Food sticker during June, you also stand a chance of winning 1 of 3 Weber MasterTouch® Charcoal Grills. Ts & Cs apply.

<http://bit.ly/2m5Pe6...> See more

MushroomsSA
Published by Kia Moraka (7) · 1 June · €

Even bad boys eat good food! It's no longer about fatty meats, processed carbohydrates, fast foods and high fat, high sodium snacks; it's more about making healthier choices.

So pick up a punnet of mushrooms with the Dude Food sticker from any participating retailer during June, and you could win 1 of 3 Weber MasterTouch® Charcoal Grills. Just like that! Ts & Cs apply.

<http://bit.ly/2m5Pe6...> See more

Organic 7,356 Paid 3,225

View Results

2 Comments 2 Shares

The Star and Pretoria News. Joint Readership: 371000

Weekend Post. Readership: 299 000



VITAMIN D CAMPAIGN

Believe it or not... Mushrooms make vitamin D from the sun, just like our bodies do.

More South Africans are becoming vitamin D deficient, even with our abundance of sunshine, because we no longer play or work outside and, when we are outside, we cover our skin with high factor sunscreens.

As mushrooms are the only plant source of Vit D and are able, like humans, to increase their Vit D levels through exposure to sunlight, it was the perfect topic for an educational mushroom campaign, and July the perfect moment to educate our fans on FB, Instagram and Twitter.

MushroomsSA
Published by Kia Moraka (1) · 25 July at 15:00 · €

"Oily fish, eggs and mushrooms are the three natural food sources of Vit D. How to get your Vitamin D fix? Our favourite recommendation is to eat and mushrooms are the only plant source of vitamin D." An added bonus is foods that are naturally rich in Vitamin D, like fresh mushrooms. They're delicious, affordable and conveniently available every day of the year on supermarket shelves! #ForTheLoveOfMushrooms #VitaminDfacts #NutritionalFoods #HealthFoods #LowCalorieFoods #Wellness

Organic 507 Paid 470

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1 Comment · Kogie Khan, John Jess Jameson and 75 others

MushroomsSA
Published by Kia Moraka (1) · 26 July at 16:00 · €

Organic 512 Paid 1,081

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20 Questions with James Crank

Assistant Technical Manager, Denny Mushrooms, Phesantekraal Farm

How did you get into Mushrooms?

Purely by accident, I discovered at a job interview that "Trainee Grower" meant mushroom growing not plant propagation, it sounded interesting, and here I still am.

How many years have you been in Mushrooms?

About 19 years (I had a two and half year spell at a wholesale nursery from 2001).

What is most difficult task you have had to undertake while in Mushrooms?

Writing an eight hour grower's exam compiled by Andy Nisbet.

What is your greatest strength/talent?

Staying calm under pressure.

What is your favourite pastime?

Bird watching and / or bush trips.

If you could change one personality/character trait you have, what would it be?

I can sometimes be a bit impatient.

As a student, what did you want to do or be after your schooling?

I wanted to go into Nature Conservation, but was put off by negative career counsellors.

What was the most significant event in your whole career so far?

Going to the mushroom school in Holland, and visiting farms in England and Ireland with Jim Dicks.

What do you feel is your greatest achievement in life?

Being a parent to the two most fantastic kids a parent could ever hope to have.

If budget was unlimited what car would you drive?

A Land Cruiser double cab, fully kitted for overlanding.

Who has had the greatest influence in your life and why?

No single person, but I've been lucky to be surrounded by family and friends who have a positive impact on my life.

What is the craziest thing you have ever done?

I climbed both, Mt Meru (4500m) and then Mt Kilimanjaro in eight days.

What are you addicted to?

The great outdoors, the more isolated the better.

Do you have a nickname and if so what is it and why?

No nickname, but my wife sometimes mutters something under her breath that I can't repeat here.

What is your favourite movie?

Probably the "Lord of the Rings" trilogy.

What cheers you up?

Shooting - the - breeze with some mates over a cold beer, or a camping trip with my wife and kids.

If you could be or were to describe yourself as an animal, what animal would it be and why?

Probably a Crimson-breasted Shrike, because it reminds me of awesome places like the Kalahari and Savuti.

What is your greatest fear?

Losing someone I care about.

What is your favourite meal?

A lamb rib slowly braaied on its side ("Staan rib").

What is the best life advice you have been given?

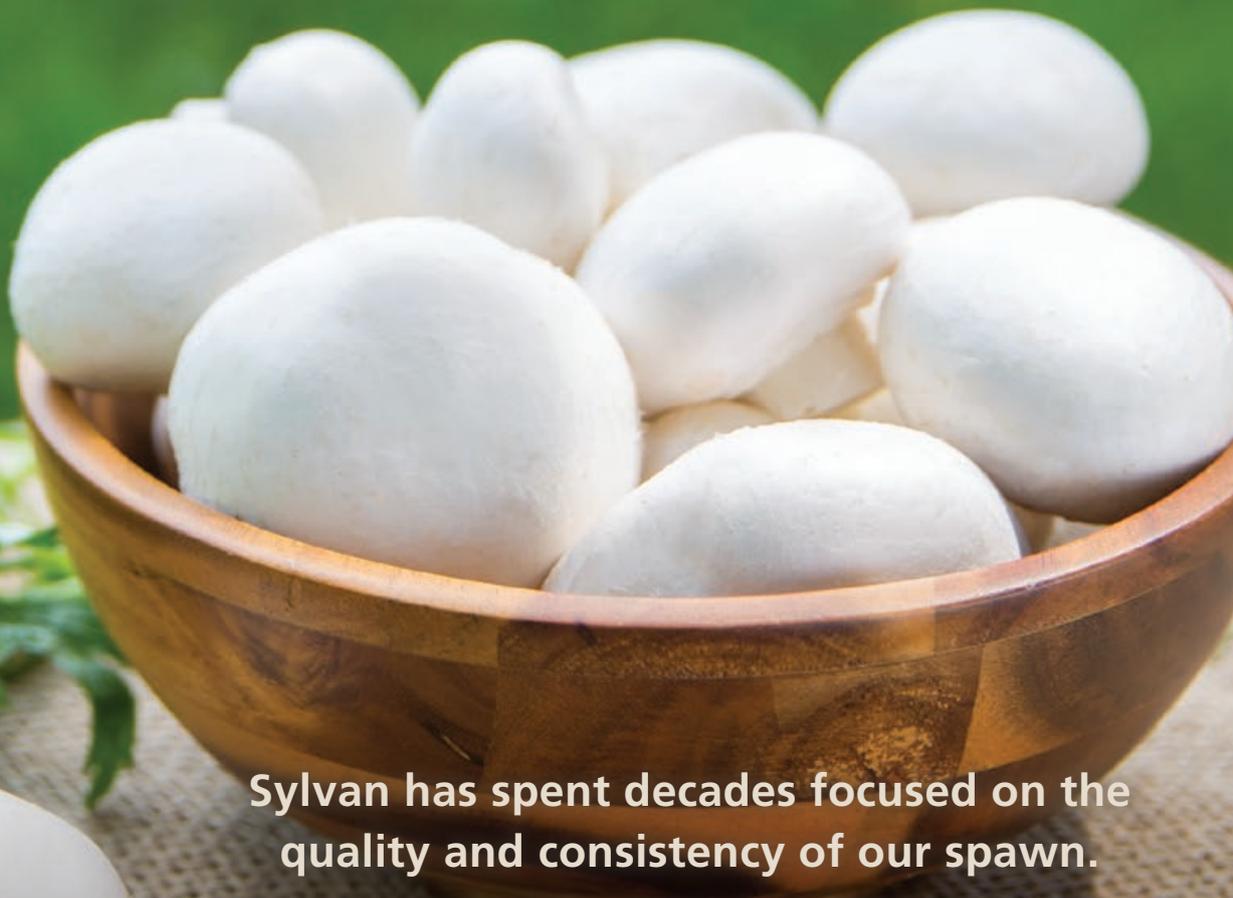
While discussing relationships, my older brother told me not to sweat the small stuff; it's the big things that determine the true value of a character.



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