ucf Undercover farming

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A CHRISTMAS WISH

Matthew 1:21-23

"She will bear a son, and you shall call his name Jesus, for he will save his people from their sins. All this took place to fulfil what the Lord had spoken by the prophet: 'Behold, the virgin shall conceive and bear a son, and they shall call his name Immanuel.'"

ucf Undercover farming

Contents

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Subscription details on p19

FRONT PAGE: Blue berry farming not without challenges: Vierfontein blue berry farm. Read pp4 and 5

INSIDE ...

Many pictures, video clips and news reaches us of devastating floods around the country. In a few places, greenhouses may be built in a low-lying area but generally it is built where flooding of such farms do not often happen. However, our hearts go out to every producer of crops or animals that experience losses in these times; no one can afford losses now as the investment and upkeep of a productive unit is challenged by increasing costs almost daily. Though, let this not put the newcomer to greenhouse farming off – a number of success stories still reaches us and it is exciting to hear how these individuals changed from former jobs to own land and invested money, time and energy to make it a financially viable entity. Yes, even some of them also experience hiccups in their enterprises but stood the test of time and came out on top looking better than the rest. In this, our last edition of Undercover Farming for 2022, we reflect on the past year which showed an increase in market activity against former years of Covid lock-downs etc., which was disastrous to say the least. Different crop specialists have shared their opinions on the future of greenhouse and shade net farming, but all agreed that, with in-depth knowledge of the carrying capacity of your cropping unit, using correct varieties and diligent management, opportunities still exist for progress in our industry. Let us not seed our younger generation with negativity on farming; rather motivate them about positive opportunities in undercover food production. May all and sundry have a well-deserved Christmas time with family and friends.

An example of top class blue berries.

BLUE BERRY FARMING NOT WITHOUT CHALLENGES: VIERFONTEIN BLUE BERRY FARM

The popular blue berries that we purchase from our local fresh producer formerly claimed to be a unique product from South Africa to foreign destinations. Several challenges developed of late, and producers have to look hard at their future with this great product while the enormous investment thus far, keep them going with hope that exports will again flourish.

Jannie Gutter, owner of Vierfontein Farm in the Napier district in the Western Cape formerly farmed with Buchu, pomegranates, figs, Protea and grapes. In 2014 he was approached by BerryWorld, a berry exporting company to participate in production of blue berries for the export market. This was a sound opportunity to progress his farming outputs.

At first seven hectares were planted under blue berries and currently but expanded to 100ha at the moment. Other current production activities on Vierfontein include 20ha grapes and 15ha flowers.

Kobus Du Plessis is the General Manager of the farm and Undercover Farming contacted him for an interview.

According to Kobus, genetics is the answer to conquer problems with blue berries. The terroir plays a great role in the quality of blue berries. During past seasons they had to make reasonable adjustments to establish the right varieties. The number of varieties was reduced to only four which produced well in their area and the team progressed in expanding the hectares under blue berries.

"Seeing that variety plays a major role, and certainly is the determining factor to the duration of time which one will produce blue berries. The plants needs to be renewed pretty quick otherwise the farmer may fall behind in a fast-changing industry."

"The varieties we initially started with, and those we currently produce, differ totally. The market changed drastically during the past few years and fruit retention determines the period which it can be produced. These days, fruit really needs to have the ability to last 50 days in the hold of a cargo vessel in CA

Utilising spaces between shadenet structures by planting blue berries.

▶ 5

chambers, against a few years ago when all produce were exported by air," Kobus explained.

"The expensive transport and airfreight simply does not make it profitable to send non-retention fruit abroad. Even if it did, fruit remains on the shelf after its long travel to the different markets. Furthermore, strikes at harbours emphasized fruit retention,"Kobus said.

Vierfontein farm is part of the BerryWorld Group and most of the farms' fruit is exported. Currently, 70 percent are exported while 30 percent is sold to the local market.

On the technical side, Kobus explains; "We use two models for planting blue berries. Some of our berries are planted in 25l pots in a uniform group medium. The other model is where we plant in sandy soil. The blue berries are on a continued fertigation system and receive daily feeding during irrigation. A low flow drip irrigation system is employed."

The Kg/plant is determined by the age of the plant as well as it pot-size. Berries can be produced off a plant of around one year old depending whether it was planted during the grow season. The berry plant should be in full production between year four and five. Then anything between five to seven kilograms of berries are borne by the plant. Again, variety plays a major role on the kilograms to be expected off a plant.

Disease resistance varies between varieties. Some varieties are more sensitive to insects while other is more sensitive to fungal diseases. It is actually a crop that requires chemical or biological plant disease control. There are stringent rules and regulations for the aforementioned and continuous tests on fruit are conducted before harvesting to prove that non-registered products were nor used.

The fruit can only be picked after a certain amount of days that the product was used to control pests or diseases. Farmers are being audited regularly to ensure these regulations are constantly adhered to. If the producer does not comply with regulations, the fruit may not be exported or even sold through any market whatsoever. Fruit are also tested by independent bodies at foreign entrances.

Blue berry picker at work!

"The berry industry is very labour intensive and we offer labour to around one thousand pickers to harvest our berries during a season," Kobus said.

"I think there are still opportunities in the blue berry market and if you compare the South African tonnage to that of other countries, there still exists room for growth in the export market.

"My personal opinion is that our local market is totally flooded. The time of season where good opportunities, growth and higher prices in vision, is closing rapidly. The landscape for opportunities changed much during the past five years. If the producer has the right varieties and his conversion rate between actual harvesting and total marketed come close in figures, it still remains a good industry to participate in.

"The market still offers possibilities for growth. More expensive labour and increasing operating costs avail further opportunities to invest in other crops, and thus not 'have all your eggs in one basket' as such.

"Agriculture remains a good industry to be involved, but on second thoughts, before investing only in blue berry production as an only and new crop; I have my personal doubts," Kobus concluded. **JS**


Snowchaser variety of blue berries planted in pots.


Blue berry pickers in full swing on Vierfontein farm.

BEAT SUMMER HEAT IN YOUR GREENHOUSES!

Good climate control management is of essence to keep plants flourishing and producing optimally. Here are a few tips on climate control measures that have been well-proven.

CLIMATE CONTROL

Ventilation cooling and shading

Removal of heat load is the major concern for greenhouse climate management in arid and semi-arid climate conditions. This can be achieved by:

- reducing incoming solar radiation;
- removing extra heat through air exchange; and
- increasing the fraction of energy partitioned into latent heat.

Shade screens and whitewash are the principle measures taken to reduce incoming solar radiation; greenhouse ventilation is an effective way to remove extra heat through air exchange between the inside and outside (when the outside air temperature is lower); and evaporative cooling is the common technique for reducing sensible heat load by increasing the latent heat fraction of dissipated energy.

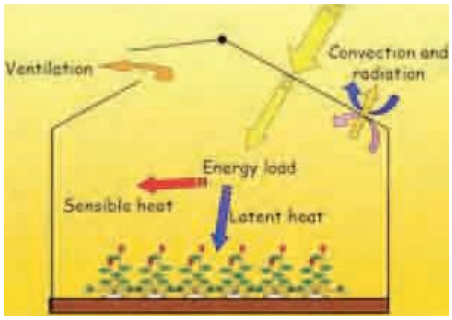
Other technological cooling solutions are available (heat pump, heat exchangers), but are not widely used, especially in a Mediterranean-climate area because they require a high level of investment.

Ventilation

High summer temperatures mean that heat must constantly be removed from the greenhouse. A simple and effective way of reducing the difference between inside and outside air temperatures is to improve ventilation. Natural or passive ventilation requires very little external energy. It is based on the pressure difference between the greenhouse and the outside environment, resulting from outside wind or the greenhouse temperature.

If the greenhouse is equipped with ventilation openings, both near the ground and at the roof, hot, internal air is replaced by cooler external air during hot sunny days when there is a slight wind. The external cool air enters the greenhouse through the lower side openings while the hot internal air exits through the roof openings due to the density difference between air masses of different temperature; the result is a lowering of the greenhouse temperature.

Sufficient ventilation is very important for optimal plant growth, especially in



the case of high outside temperatures and solar radiation – common conditions during the summer in Mediterranean-climate countries. In order to study the variables, determining greenhouse air temperature and calculate the necessary measurements for temperature control, a simplified version of the greenhouse energy balance is formulated. Kittas et al. (2005) simplify the greenhouse energy balance.

Greenhouse energy balance

The necessary ventilation rate can be obtained by natural or forced ventilation; ventilators should, if possible, be located at the ridge, on the sidewalls and the gable. A total ventilator area equivalent to 15–30 percent of the floor area was recommended by White and Aldrich (1975); over 30 percent, the effect of additional ventilation area on the temperature difference was very small.

Some systems, including exhaust fan and blower, can supply high air exchange rates when needed. These simple and robust systems significantly increase the rate of air transfer from the greenhouse; consequently, the inside temperature can be kept at a level slightly above the outside temperature.

GAPs for greenhouse vegetable crops:

Principles for Mediterranean climate areas

The principle of forced ventilation is to create airflow through the house. Fans suck air out on one side, and openings on the other side let air in. Forced ventilation by fans is the most effective way to ventilate a greenhouse, but it consumes electricity.

It is estimated that the electrical energy requirements for ventilation of a greenhouse located in a Mediterranean climate are about 70 000 kWh per greenhouse ha. Kittas et al. (2001) studied the influence of the greenhouse ventilation regime (natural or forced ventilation) on the energy partitioning of a well-watered rose canopy during several summer days in warm Mediterranean conditions.

When not limited by too low external wind speed, natural ventilation could be more appropriate than forced ventilation, creating a more humid and cooler environment (albeit less homogeneous)

▶ 7

Exhaust fan and blower

around the canopy. Many researchers also studied the effects on greenhouse microclimate of insect-proof screens in roof openings

Fine mesh screens obstruct the airflow, resulting in reduced air velocity and higher temperature and humidity, as well as an increase in the thermal gradients within the greenhouse (Katsoulas et al., 2006).

Shading

Natural or forced ventilation is generally not sufficient for extracting the excess energy during sunny summer days (Baille, 1999), and other cooling methods must be used in combination with ventilation. The entry of direct solar radiation through the covers into the greenhouse enclosure is the primary source of heat gain.

The entry of unwanted radiation (or light) can be controlled by shading or reflection. Shading can be achieved in several ways: paints, external shade cloths, nets (of various colours), partially reflective shade screens, water film over the roof and liquid foams between the greenhouse walls. Shading is the last resort for cooling greenhouses, because it affects productivity; however, shading can in some cases result in improved quality.

A method widely adopted by growers because of its low cost is white painting, or whitening, of the cover material. The use of screens has been progressively accepted by growers and the last decade has seen an increase in the area of field crops cultivated using screens in greenhouses (Cohen et al., 2005). The Dutch perfected screen automation over years.

Insect-proof screen in roof opening.

Ventilation – GAP recommendations

- For coastal Mediterranean climate areas, where during the critical summer period, outside solar radiation exceeds 900 W m-2, a ventilation rate of about 0.06 m3 s-1 m-2 (corresponding, for a greenhouse with a mean height of 3 m, to an air exchange of 60 h-1) is needed to maintain a ΔT of about 4 °C. Natural ventilation allows for an air exchange rate of about 40 h-1, above which, forced ventilation is necessary.
- For maximum efficiency, ventilators should, if possible, be located at the ridge, on the side walls and the gable.
- Total ventilator area equivalent to 15–30 percent of floor area is recommended; above 30 percent, the effect on the temperature difference is very small.
- If the external wind speed is not too low, natural ventilation can be more appropriate, creating a more humid and cooler (albeit less homogeneous) environment around the canopy.
- With roof ventilators, the highest ventilation rates per unit ventilator area are obtained when flap ventilators face the wind (100%), followed by flap ventilators facing away from the wind (67%); the lowest rates are obtained with rolling ventilators (28%).
- Systems such as exhaust fan and blower can supply high air exchange rates whenever needed. These simple and robust systems significantly increase the air transfer rate from the greenhouse, maintaining the inside temperature at a level slightly higher than the outside temperature by increasing the number of air changes.
- Forced ventilation by fans is the most effective way to ventilate a greenhouse, but electricity consumption is high. The estimated electrical energy requirements for ventilation of a greenhouse located in a Mediterranean climate are about 70 000 kWh per greenhouse ha.
- Ventilation fans should develop a capacity of about 30 Pa static pressure (3 mm on a water gauge), they should be located on the lee side or the lee end of the greenhouse, and the distance between two fans should not exceed 8–10 m. Furthermore, an inlet opening on the opposite side of a fan should be at least 1.25 times the fan area. The velocity of the incoming air must not be too high in the plant area; air speed should not exceed 0.5 m s-1. The openings must close automatically when the fans are not in operation.
- With fan cooling alone (no evaporative cooling), little advantage can be derived from increasing airflow rates beyond 0.05 m s-1.

Evaporative cooling

One of the most efficient solutions for alleviating climatic conditions is to use evaporative cooling systems, based on the conversion of sensible heat into latent heat through evaporation of water supplied directly into the greenhouse atmosphere (mist or fog system, sprinklers) or via evaporative pads (wet pads).

Evaporative cooling allows simultaneous lowering of temperature and vapour pressure deficit, and its efficiency is higher in dry environments. The advantage of mist and fog systems over wet pad systems is the uniformity of conditions throughout the greenhouse, eliminating the need for forced ventilation and airtight enclosure. Before installing a system, the air- and water flow rates required must be calculated.

▶ CONTINUED ON PAGE 10

Fog system used for greenhouse cooling

LINDSAY RZ F1 – A RIJK ZWAAN TOMATO VARIETY FOR NET-HOUSE PRODUCTION IN SUMMER

The tomato is one of the most common vegetables found on shelves in South Africa (and the world). And yet, it proves to be one of the most complex vegetables to produce. Nevertheless, being a staple commodity and a so-called "high-income" crop; it still is a favourite among consumers and producers alike.

Summer production of tomatoes in South Africa mainly takes place in the open field, with the addition of nethouses and a portion of production in greenhouses and single plastic tunnels. The utilisation of protected cultivation techniques offers some form of risk mitigation for growers, protecting the crop from extreme climatic conditions and weather events.

Enter LINDSAY RZ F1 - a high yielding indeterminate, round tomato variety ideally suited to protected cultivation in nethouses. During the last few years, LINDSAY RZ F1 has proven to be a dependable tomato variety for production in nethouses and some farmers even had ample success in the open field. Key to the success of LINDSAY RZ F1 is its strong plant vigour and ability to set fruit during summer conditions.

Ideally, LINDSAY RZ F1 is pruned to 1- or 2-stems when cultivated in the nethouse. This promotes the development of strong flower clusters that support the variety in producing ideal fruit weights of average 140-180g per fruit. The pruning action also effects a generative input on the plant balance that promotes fruit setting for such a vigorous plant. In this situation, LINDSAY RZ F1 also keeps good fruit sizing right to the top clusters with a lower variation in fruit size from the first to last clusters. These attributes contribute to easier sizing in the pack house and better consistency throughout the season.

The plant of LINDSAY RZ F1 is ideally suited to protected growing circumstances with short internodes – giving more clusters before the wire. It also features an upright leaf bearing habit – this contributes to better airflow in the crop, that in turn reduces the risk of disease development and increases spray penetration when chemical control measures are used.

LINDSAY RZ F1 has also proven that it can support its yield and plant attributes with its consistent fruit quality. Apart from producing good-looking fruit, the fruits from this variety are also extremely firm with a long shelf life.

So let's talk some numbers…

With LINDSAY RZ F1, you have the ability to harvest for 16 to 20 weeks depending on the health of the plants. By planting at a density of 12 000 to 15 000 plants per hectare and trellising each plant to 2-stems, you can expect to harvest 10-12 clusters per stem (20-24 per plant). This offers a yield capability of 144 – 172 tons per hectare - with the highest recorded commercial yield of LINDSAY RZ F1 at 179 tons per hectare.

Ultimately, LINDSAY RZ F1 gives consistent volumes of high quality fruit combined with high total yield potential. Talk to your nearest Rijk Zwaan representative to discuss your next tomato variety choice. We also offer varieties suited to open field and greenhouse production situations. **RZ**

RIJK ZWAAN

Sharing a healthy future

FIND YOUR VARIETY

Rijk Zwaan offers a wide range of high-quality vegetable varieties. We select and test them thoroughly to ensure their suitability for growing in South African conditions. In addition to the seeds themselves, we also provide reliable information about the performance of our varieties and expert cultivation advice from our crop specialists. This ensures the grower has the best start to a successful harvest.

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To improve the taste of 'Daniela', one of the first 'long shelf life' tomato cultivars grown in South Africa, the nutrient solution's EC of 2 mS cm-1 was increased to 4 mS cm-1 by adding NaCl at 20 meq L-1 to the solution.

EC AND NUTRIENT UPTAKE OF GREENHOUSE PLANTS

The size of a root system as well as the ion concentration in the root zone affect ion uptake. A linear increase in ion uptake follows when the nutrient concentration is increased, but only within limits. As soon as the EC rises above a certain level, the rate of ion uptake decreases.

Although the uptake of all the ions decrease at excessively high EC levels, the uptake of the big, double charged Ca ion is suppressed the most. This explains the higher incidence of Ca-deficiencies such as blossom-end-rot and tip-burn when salts accumulate in root zones due to insufficient drainage or poor irrigation practices.

Even a saline-tolerant crop such as Amaranthus grows slower when the EC of the root zone solution is increased beyond its optimum need. Benoit compared a salt sensitive- to a salt tolerant rop and found that the yield potential of the sensitive crop declined at a rate of at least 10% for each 1 mS cm-1 rise beyond its optimum EC of 2 mS cm-1. The yield of the salt tolerant crop only declined at EC levels higher than 4 mS cm-1.

To improve the taste of 'Daniela', one of the first 'long shelf life' tomato cultivars grown in South Africa, the nutrient solution's EC of 2 mS cm-1 was increased to 4 mS cm-1 by adding NaCl at 20 meq L-1 to the solution. The fruit's total soluble solids (oBrix) increased significantly, but the associated higher sugar percentage was due to less water being taken up (more concentrated fruit juice) and not due to better sugar production.

This was reflected by an associated 30% reduction in yield and fruit size. The optimum nutrient solution EC is also affected by the prevailing growing conditions. Under high light intensities and low humidity levels, plants need more water. Extra care should then be taken not to use high EC nutrient solutions that may restrict the uptake of water.

Similarly, under conditions where water uptake and transpiration rates are limited due to low temperatures, low light intensities or high humidity levels, the uptake of water will be low, limiting nutrient uptake. To improve nutrient uptake, the nutrient solution concentration may then be increased.

As a rule of thumb: During sunny, hot and low humidity conditions (with poor climate control structures) the EC of the nutrient solution should be reduced by lowering the nutrient solution concentration with 15 to 25%.

By: Dr NJJ Combrink, SU Horticulture from his book: 'Nutrient solutions and Greenhouse management' only available from the Combrink family trust: E-mail: njjc@sun.ac.za

▶ FROM ON PAGE 7

Fog system

Water is sprayed as small droplets (in the fog range, 2–60 nm in diameter) with high pressure into the air above the plants in order to increase the water surface in contact with the air (Plate 7). Free fall velocity of these droplets is slow and the air streams inside the greenhouse easily carry the drops. This can result in high efficiency of water evaporation combined with keeping the foliage dry.

Fogging is also used to create high relative humidity, along with cooling inside the greenhouse. A wide range for fog system cooling efficiency (nf,cool) is reported in the literature. According to Arbel et al. (2003), increased efficiency in the cooling process in relation to water consumption can be expected if fogging is combined with a reduced ventilation rate. Furthermore, a close relationship has been observed between nf,cool and system operation cycling (Abdel-Ghany and Kozai, 2006). Similar values for nf,cool have been reported by Li etal. (2006), who concluded that fog cooling efficiency increases with spray rate and decreases with ventilation rate.

Source: Various experts on ventilation

▶ 11

NEW TECHNOLOGY:

Hydrophobic thin film coating from buffalo fat for Fresh Produce Preservation

Scientists from the National Research Center in Cairo, Egypt, have reported the development of a hydrophobic thin film coating for harvested fruit preservation. Their findings appear in the journal Scientific Reports.

Ensuring the Quality of Fresh Fruit and Vegetables

Fresh fruit and vegetables are an essential part of a healthy diet, possessing good nutritional benefits due to the presence of organic acids, vitamins, minerals, sugars, phenolic compounds, and carotenoids.

The valuable chemicals in fresh fruit and vegetables have many health benefits, such as antioxidant properties, anti-inflammatory properties, and anti-coagulant properties, and helping to prevent potentially fatal conditions like heart disease.

Ensuring the freshness and quality of fruit and vegetables is essential, and severe post-harvesting quality issues can occur due to mechanical damage, chemical action, and microbial activity. Environmental factors in the supply chain, from transportation to marketing processes, such as humidity, vibration, and shock, reduce the quality and shelf life of products.

Furthermore, these products have a limited shelf life, which limits long-distance transportation, and they are not available all year round. The various issues across the entire food supply chain lead to product waste and economic loss. To overcome these critical challenges, researchers have developed improved storage and preservation techniques over the years.

Biodegradable Films

Packaging technology has evolved over the span of the past several decades, offering improved preservation of fruit and veg and, thus, extending their shelf lives and enhancing the quality, freshness, and nutritional content of products. Suitable packaging can prevent issues such as gas exchange, moisture, microbial growth, firmness loss, and various physiological disorders.

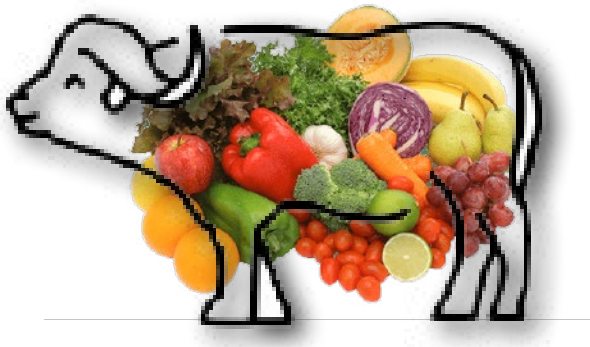
Thin film packaging technologies have been the subject of intense research in recent years, with various synthetic and organic-based polymers and materials explored by academics in the food production sector. Bio-derived materials have emerged as viable alternatives to synthetic polymers because of benefits such as biodegradability, biocompatibility, non-toxicity, and sustainability.

The use of biodegradable thin films overcomes several reported issues with synthetic packaging, such as waste, the use of non-renewable petrochemical-derived products, and carbon emissions produced during plastics manufacture.

Biodegradable films can be easily functionalized with useful properties such as antimicrobial behaviour to create antimicrobial films and offer the additional benefit of being edible. Natural material sources such as cellulose, starch, gelatine and milk proteins can be used to manufacture organic thin film coatings for fresh vegetable and fruit products.

The focus of the current study in Scientific Reports is the development of a novel hydrophobic waxy thin film coating for fresh fruit preservation and quality assurance. The coating is prepared from stearyl stearate, which lacks an unsaturation center in its hydrocarbon chain. Buffalo fat was chosen as the natural material for the synthesis of the proposed film as it contains high levels of stearic acid.

Tomatoes were selected as the target product for the study. The stearyl stearate-coated tomatoes were compared to tomatoes coated with chitosan. Over a fifteen-day period, the coated products were evaluated for firmness, pH, weight loss, concentrations of ascorbic acid, and soluble solids. Sensory evaluations were also carried out as well as acute oral toxicity lab tests on albino mice.



Dry rendering was used to extract fat from adipose tissue sourced from buffalo meat to prepare the stearyl stearate films. This process was carried out for three hours at 90°C. Once cooled to 50°C, a filtration method was applied, and the fat was stored at 5°C until analysis. Elemental analysis, as well as spectral data, confirmed the chemical structure of the prepared stearyl stearate compound.

Quality parameters such as acid value, refractive index, iodine value, peroxide value, and determination of the compound's content of un-saponifiable matter were determined and characterized. Additionally, oil hydrolysis and fatty acids concentration were analysed and characterized. The authors performed analytical determinations and experiments three times, with the averages and standard deviations statistically analysed.

Study Conclusions

Freshly harvested tomatoes are especially sensitive to fast spoiling. The prepared waxy, biodegradable, non-toxic, and sustainable buffalo fat-derived sterile stearate thin film coating presented in the research was effective at delaying ripening and associated spoilage issues.

By controlling water permeability through the fruit's epidermis, the hydrophobic film can extend shelf life. Soliman, H.A & Zahran. H.A., Scientific Reports

THE SCARE OF GREENHOUSE PLANTS: Fusarium Wilt

Fusarium wilt is a devastating disease that affects many important food and vegetable crops.

Fusarium wilt is caused by the fungal pathogens, Fusarium oxysporum or Fusarium solani. It is a devastating disease that affects many important food and vegetable crops and a major source of loss to farmers worldwide.

Managing Fusarium

Fusarium wilts are found when high air and soil temperatures (75° to 86°F) and disease may not occur at low soil temperatures (below 68°F). An infected plant may remain without at lower temperatures. The fungus spreads through the use of infected cuttings or other forms of vegetative propagation taken from what appears to be healthy plants which meanwhile are infected.

In general, symptoms include yellowing and stunting of older plants and even dying seedlings. Infected plants wilt fairly fast, the lower leaves turn yellow and dry, the xylem tissues turn brown, and the plant often dies. The roots are not rotted at the early stages of the disease,. Wilt on Tomatoes (Fusarium oxysporum f. sp. Lycopersici)

This attacks only certain tomato cultivars. Look for leaf yellowing and wilting that progress upward from the base of the stem. Initially, only one side of a leaf midrib, one branch, or one side of a plant will be affected. The symptoms soon spread to the remainder of the plant. Wilted leaves usually drop prematurely. Splitting open an infected stem reveals brownish streaks extending up and down the stem. Plants are susceptible at all stages of development, but symptoms are most obvious at or soon after flowering.

Managing Fusarium fungus

A good knowledge of the nature, behaviour and environmental conditions of growth of the disease agent is very important to controlling the disease development in that case. Biological control has been shown to be an environmentally friendly alternative. It makes use of rhizospheric and endophytic microorganisms that can survive and compete favourably well with the Fusarium wilt pathogen.

They include plant growth-promoting rhizobacteria (PGPR) such as Bacillus spp. and Pseudomonas spp. For PGPR to control or inhibit the growth of the Fusarium wilt pathogen, they make use of mechanisms such as indole acetic acid production, siderophore production, phosphate solublilization, systemic resistance induction and antifungal volatile production among others.

In general, Fusarium wilt diseases are best controlled by using resistant or tolerant cultivars, not by using soil applied fungicides. Liming soils and using nitrate nitrogen fertilizer have been effective for management of F. oxysporum on chrysanthemum, aster, gladiolus, cucumber, tomato, and watermelon. Initial strategies developed to combat this devastating plant disease include the use of cultural, physical and chemical control. None of these strategies have been able to give the best results of completely ameliorating the situation except for the cultural method which is mainly preventive.

In greenhouses however, the best preventative control is to disinfest seed or plant beds by treating with steam. Prevention and exclusion are the only effective management strategies. Avoid this problem by replanting at that site using species from different genera than plants previously infected there by Fusarium. **From: Various plant technical sources**

A serious attack of Fusarium wilt on a tomato plant.

HAIL WREAKS HAVOC ON TABLE GRAPE VINES

A tremendous hailstorm recently hit areas to the north of Groblersdal while the table grape season started, and young fruit appeared in citrus orchards.

A tremendous hailstorm recently hit areas to the north of Groblersdal while the table grape season started, and young fruit appeared in citrus orchards.

Limpopo is a renowned area for its high hail factor and storms appear quick with no warning, according to growers. This happened again during November and was also gone within 30 minutes. The path of the hail was limited and it fell over a small area between Groblersdal and Marble Hall, fortunately not affecting the whole region.

Anton Viljoen, chairperson of the South African Table Grape Industry reported that the extent of the damage is being calculated but, for the moment it appears too small to necessitate a change to the national table grape estimate.

Although installing shade/hail nets over vineyards or other fruit could be a costly investment, loss through damage by one severe hail storm might have paid largely towards it.

Hail nets

Some farmers received only rain, but no hail at all. Other confirmed to have experienced hail, but most expressed their satisfaction with their shade net system above the orchards which prevented large damages. Some netting sustained structural damage, but in general the nets functioned according to its specifications and the grapes look good. So much so that it was reported that the packing continued after the storm.

Much water flows away after such a storm and does not drench the soil therefore the actual water uptake of the soil is not of major concern to the grape vines. Producers are very focused on quality and are very aware packing healthy grapes that will be delivered in good condition at the outlets.

With rising costs in packing material and slower than normal sea freight deliveries, most are aware of the importance of safe arrivals at foreign markets.

Table grape farmers in the Northern Region have had to deal with rain (and hail) for decades. Plastic covering structures over the grape vines to keep it dry during rain, and hail nets during storms, are standard practice.

Western Cape

Weather reports has it that a powerful cut-off low system, fed by tropical air from the equator, is moving from west to east over South Africa, bringing unusual amounts of rainfall. The South African Weather Service warned of severe weather, including disruptive showers and flooding, accompanying the weather system.

Hail over Groblersdal area is not uncommon, but very unusual for hail to fall over the Witzenberg Mountains close to Ceres and the Koo Valley adjacent to Montagu, like in November. The same large weather system brought hail far north.

SATG

Table grape producers are very focused on quality and shade (hail damage preventing) net constructions are found on most farms in hail-prone areas.

Flower buds differentiation is one of the most important initial growing stages for better production.

FLOWER BUDS DIFFERENTIATION IMPORTANT TO TOMATO YIELD

The tomato (Lycopersicon esculentum) is a fruit vegetable crop and is produced throughout the world by various categories of farmers, from backyard, small to commercial farmers. It is planted in both open and close (tunnel) areas for fresh and industrial markets. Tomatoes are transplanted to the field as seedlings for better establishment and production (yield). The tomato can be grown as indeterminate or determinate plant.

Flower buds differentiation is one of the most important initial growing stages for better production, because it influences the quantity and quality of tomato yield, especially from the first three fruit clusters.

The process of flower buds differentiation occurs mostly from 25 – 30 days after seed germination and can only be observed under microscope. Most of both tunnel and open field producers do not regard flower bud differentiation as one of the important growth stages in tomato production for better initial yield. Poor quality growth media and incorrect temperature promote poor flower buds differentiation.

Relationship between flower buds differentiation and tomato production (yield)

Flower buds differentiation is primarily influenced by quality of growth media and optimum temperature. When tomato seeds are planted in good quality growth media with balanced nutrients, enough aeration and drainage, seedlings will be healthy and strong. Therefore they will be able to develop good flower bud differentiation.

Optimum temperature (240c –280c during the day and 120c – 150c during the night) is needed for good flower bud differentiation after sowing and before transplanting. After the 8th or 9th leaf has been differentiated in the apical meristem (growing point), the first flower bud is mostly differentiated.

Stage of flower buds differentiation can only be observed under microscope. Visual appearance of the plant at this stage is a small seedling with two to three (2-3) true leaves, which is mostly

▶ 15

25 to 30 days after germination, as indicated in figure 1.

Flower buds differentiation is physiologically a very important stage for the growth of the tomato plant and it is advisable not to apply fertilizer, especially nitrogen until differentiation of the first three flower buds are completed. When nitrogen is applied before or at flower bud differentiation stage the process may be delayed or poorly developed, due to a high rate of vegetative growth.

If the vegetative growth is vigorous, the reproduction development of a crop is poor. After buds differentiation the growing point will differentiates three (3) leaves, and then differentiates the second flower bud and the process continues until the plant is pinched or matured.

Differentiation of the first to third flower buds is completed mostly from 30 – 35 days after germination or at 6 true leaf stage, as indicated in figure 2.

Monitoring

Tomato plants need close monitoring from seedling stage. Seedlings must be well established. Flower buds differentiation is one of the most vital early growth stages in tomato production for better initial yield, especially on indeterminate tomato plants. Producers need to create favourable conditions for development of good flower buds differentiation.

It is necessary to utilize quality growth media and optimum temperature for better flower buds differentiation. The application of fertilizer after seed germination, especially nitrogen should be avoided or regulated until the formation of first to

third flower buds, which takes about 25 – 35 days after germination or from 2 to 6 true leaves stage. Therefore growth media must have balanced nutrients to avoid nutrient deficiency during flower bud differentiation and seedlings must be produced under optimum temperature for better flower bud differentiation and initial yield.

By: LMJ Dikolomela, Crop Science; N-West DACE

ODE AAN HET TOMAAT

(Ode to the tomato, by Pablo Neruda)

Middag en zomer,
de straat verdrinkt
in tomaten.
Het licht deelt zich
in twee tomaten helften
en het sap stroomt
door het straten.
In december breekt
de tomaten z'n ketenen
en dringt de keukens binnen,
komt aan voor de lunch
gaat kalm zitten
in de dressoirs
tussen de vazen en botervlootjes
en de blauwe zoutvaatjes.
De tomaat heeft een eigen licht
en een goedaardige grootheid.
Maar helaas,
We moeten hem vermoorden,
Het mes zinkt diep
in zijn levend vlees,
de roode ingewanden
een nieuwe zon,
diep en onuitputtelijk.
Op de slaschotels van Chilli
huwt hij de heldere ui
en om het te vieren
plengt men olie,
eerstgeborene van de olijf.
Aan zijn halfgeopende hemispheren
Voegt de peperkorrel zin geur toe,
Het zout zijn magnetisme.
Dit zijn de bruiloften
van alledag, de peterselie
steekt z'n vlaggetjes uit
de spijzen borrelen
en het gebraad klopt met z'n geur
aan de deur.
Het is tijd. Laten we gaan.
Op tafel in de schoot van de zomer
de tomaat, ster van de aarde,
duizendvoudige, vruchtbare ster.
Die ons zijn windinge toont,
zijn kanalen, zijn voorteffelijke
volheid en zijn overvloed,
zonder pit, zonder pantser,
zonder schubben en doornen
die ons het geschenk bidet
van zijn onstuimige kleur
en die volheid van zijn koelte.

(Seen at display at Tomato World, Netherlands.)

Drugs concealed in South African fruit might be a "new modus operandi" by thugs.

DRUGS CONCEALED IN SOUTH AFRICAN FRUIT?

For many years the South African Fruit and Vegetable industry was internationally known for quality, consistency and well-managed produce. Somehow, this image is under serious attack with yet another situation.

Indian authorities recently announced they intercepted drugs, worth R4.3 billion, in consignments of apples, pears and oranges, imported from South Africa. Now this country has pledged to help them investigate the smuggling.

Media reports from there showed their customs received a tipoff ahead of multiple drug seizures, among the largest ever. Drugs concealed in South African fruit might be a "new modus operandi" of thugs.

The Hindustan Times has reported that in the first week of October large amounts of cocaine and crystal metamphetamine (Tik) were found in several containers carrying green apples and Valencias from South Africa.

The fruit was on its way from a cold store when it was intercepted after police had reportedly received a tip-off that drugs would be concealed amongst the fruit, reports the Indian Express. Busts were made several days apart at the Jawaharlal Nehru Port in Nava Sheva, Navi Mumbai.

Reportedly, just below 10kg of cocaine and 198kg of metamphetamine were hidden in boxes of South African Valencias during the first bust, says that Indian customs had received a tip-off that high-value drugs would be entering the country hidden amongst South African fruit. Also, allegedly 50kg of cocaine was found in the second bust. The total value of the drugs was said to be around R4.3 billion.

A source quoted by the Indian Express reported this to be a new kind of 'modus operandi' involving the concealing of drugs in boxes of oranges imported from South Africa.

The report on the Indian Express website includes a photo of the cartons showing oranges in what appears to be the Jupiter Group's Elara Gold citrus brand and bags of white powder, evidently the confiscated drugs. Also; the possibility that these are counterfeit branded cartons is high, according to an industry source this brand was never traded in India.

Suspicious contact details

The report in The Hindustan Times alleges the exporting company is based (according to its website) in hall 9 of the Johannesburg Fresh Produce Market, though a manager at the Johannesburg municipal market said while the address is a real one, it is currently rented by another company.

They have no knowledge of the implicated fruit exporting company whose telephone numbers on the website are non-functional.

The Fresh Produce Exporters' Forum confirmed the fruit exporter implicated in the drug bust in India, to be not registered as a member.

Source: Hindustan Times

The Cannabis Research Institute of South Africa (CRI) has sponsored a year-long study that examines the effectiveness of medical cannabis as an alternative to opioids for chronic pain management. In addition to demonstrating therapeutic efficacy and pain relief, the objective is to provide credible, reliable, and verifiable data to the relevant authorities to regulate the availability of medicinal cannabis. This is good news to local medicinal use cannabis producers for the credibility of their produce will be underscored.

SA'S CANNABIS RESEARCH INSTITUTE TO SPONSOR FIRST OBSERVATIONAL CLINICAL TRIAL

A global crisis continues to arise as a result of opioid misuse, which is responsible for thousands of deaths every year. Overdose deaths from drugs in the United States numbered 91,799 in 2020, with opioids accounting for 68,630 (74.8%). According to estimates by the World Health Organization focused on Opioid overdose, approximately 115 000 people died of opioid overdose in 2017. Medications such as morphine, fentanyl, and tramadol are commonly used as opioid pain relievers.

The WHO further states that it is possible to become dependent on opioids if non-medical use, prolonged use, misuse, and use without medical supervision are involved. Overdoses caused by opioids can be fatal due to their pharmacological effects.

First clinical trial

Since the cannabis industry has become more customer-centric and customer-facing over the past few years as patients, consumers, and society have become more educated, the industry has seen significant growth. In collaboration with the Releaf Cannabis E-Clinics, a member of the ImpiloVest group, participants of the latest ground-breaking study will have access to their medicinal cannabis through the study. Patients who register for the study will not be charged for their medication as part of the sponsorship.

Dr. Shiksha Gallow, the Principal Investigator on the research study, a Cannabis Clinician, and global cannabis leader, will work alongside a team of highly skilled doctors in the medical cannabis industry including Dr. Regina Hurley, Dr. Ahmed Jamaloodeen, Dr. Omphemetse Mathibe, and Dr. Xavagne Leigh Fransman. Dr. Gallow says that while the South African Health Products Regulatory Authority (SAHPRA) does not yet have any official cannabis-containing medicines approved for pain relief, anecdotal evidence and preliminary studies point towards its potential to be highly effective in pain management.

She explains: "Chronic pain is defined as pain that lingers for longer than six months and can be categorised as visceral, somatic, and neurogenic. Given the broad spectrum, a wide range of treatments exist, from over-the-counter drugs; to opiates such as morphine, oxycodone, or codeine, which instruct the body's natural opioid receptors to prevent the nerves responsible for pain from signalling."

Furthermore, Dr. Gallow notes that while opiates can be highly effective in pain management, over time the body will develop a tolerance, meaning that the dose needs to be systematically increased to bring relief, which can lead to dependence. "In addition, opiates are associated with a plethora of side effects, including sedation, respiratory depression - and even death. With the global increase in opiate addiction, which brings with it far-reaching repercussions - from ill health to broader societal issues such as crime - the research will be focussed on establishing a safer alternative to treating pain.

Bella Dorrington, a Senior Researcher at The Cannabis Research Institute of South Africa, says the study has the potential to change the medicinal landscape not only in the country but across the globe. "CRI is pleased to participate in this study, which aims to emphasise the benefits of cannabis treatment. South Africa is poised to set a standard for medicinal cannabis in the world's market as we have the resources, technology, and people to make it happen. The culture at our company is one of collaboration, not working in silos."

Medical cannabis is gaining a great deal of attention as a powerful and proven alternative to conventional medicine. A primary healthcare approach is high on the priority list of people who cultivate a healthy lifestyle.

The study, which has received worldwide interest with many countries and international medical professionals eagerly awaiting the results, has been approved by Pharma-ethics, the Department of Health (DOH), and the South African Medical Research Council (SAMRC).

Source: CRI

Tomato seedlings grown stronger in a greenhouse.

PRODUCING SEEDLINGS TO CAPTURE THE EARLY SUMMER SEASON

Seedling nurseries are often asked during the cooler months to produce tomato and pepper seedlings for greenhouse producers in warmer areas, or for those who wants to capture the market early. Unlike summer seedling production, the management of winter seedling production needs expert management to ensure maximum protection of the seed and seedlings from cold and possible damages.

It is said seed is a "living organism" and is sensitive to the environment that it is subjected to. During the germination and subsequent development of the seedling, it is just as important to control the surrounding environment. Many seedling nurseries do just that with heated germination rooms where seedling trays are stacked for a predetermined amount of time to allow germination to occur. At emergence, the trays are usually transferred out into the nursery where the seedlings are allowed to develop.

The fine-tuned management of germinating seed is essential to ensure maximum germination and subsequent development of the plant. Tomatoes require the following temperature condition for germination:

The temperature impacts the actual germination process, and also the rate of seedling emergence.

The information in the tables stresses the importance of temperature on the most important phases of the germination and emergence of tomato seed. Peppers have a similar sensitivity to temperature and should also be managed accordingly. During the cooler periods of the year, temperature fluctuations during germination and emergence of the seedlings will result in poor germination, uneven emergence, slow development of seedlings and sometimes a poor pull rate.

This common occurrence is often mistaken for poor quality seed, but the same seed lot will provide almost perfect germination, emergence and development when temperatures rise.

Most foremost seed producers provide a temperature range test with their tomato and pepper seed. The range test describes the effect of various temperatures on the germination of the particular lot.

Table 1: Seed Germination Temperature for Tomatoes:

Characteristic	Seed Germination Temperature (oC)
Minimum	10
Optimum Range	16 – 29.5
Optimum	29.5
Maximum	35

Table 2: Days to Seedling Emergence for Tomatoes (Benton Jones, 1999)

Soil Temperatures for Germination (oC)	Seedling Emergence (Days)
10	43
15	14
20	8
25	6
30	6
35	9

Each seed lot responds differently to temperature regimes and therefore, each seed lot is tested accordingly. The importance of these range tests illustrates how a particular seed lot needs to be treated to acquire the best germination and emergence of peppers and tomatoes.

During warmer periods of the year, the relatively higher temperature of the air outside the germination room prevents excessive heat loss from the room resulting in better control of the temperature within the germination room. However, during cooler periods, the lower ambient temperature makes it more difficult to maintain a constant temperature within the germination room.

There are many methods, varying in expense, used for heating these germination rooms. Some nurseries do not heat; others use air conditioners. The size of the room should determine the size of conditioner required to maintain the temperatures required for proper germination and emergence. Strict control of the room temperature is only possible air conditioners.

Nurseries that do not provide any heating should not produce more sensitive seedlings out of season. It is recommended that germination rooms be installed to assist in the production of high quality seedlings to their clients.

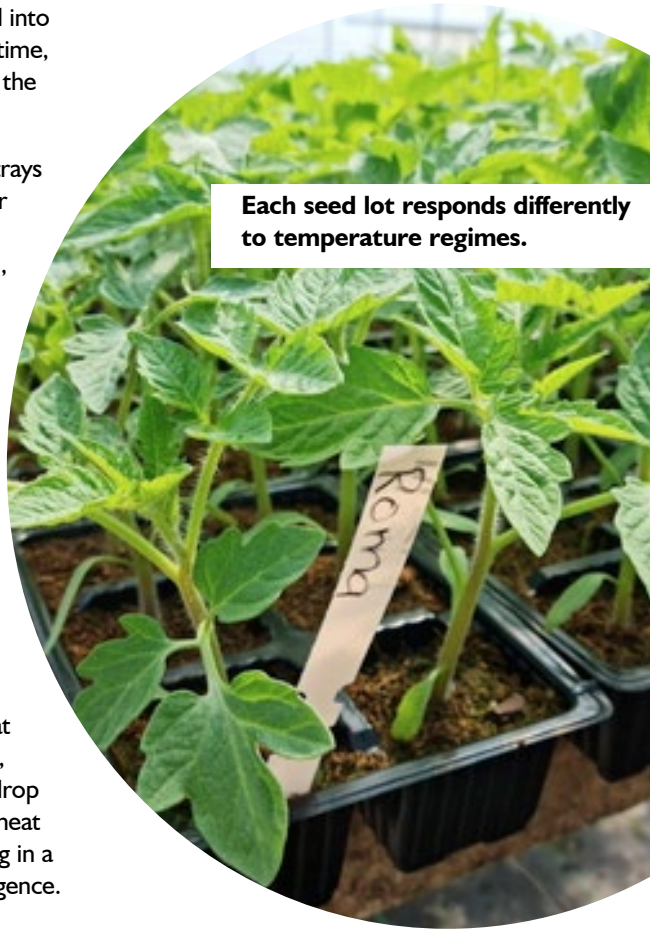
When cold grow media and cold water are used to fill and water the trays, it will take longer to warm up the medium to reach the optimal range for germination and emergence. If a large number of trays are stacked together before being put into the germination room, it will take longer for the trays in the centre of the stack to heat up. If a large number of trays or several stacks are placed into the germination room at the same time, more heat will be required to raise the temperatures of all the trays.

The size and shape of the stack of trays will affect the ability of the warm air to heat up the cells in the centre of the stack. During the cooler season, smaller stacks should be used to allow for better heating of the trays. Trays should be arranged into longer thinner stacks to allow for better heat penetration.

A larger germination room will obviously require more heat to raise the temperature to optimum levels, and when a large number of trays are installed into the room, even more heat is required.

Rooms that are not adequately insulated will also require more heat to maintain adequate temperatures, and should a sudden temperature drop be experienced, a large amount of heat may be lost from the room resulting in a reduction in germination and emergence.

The movement of air in a germination room is also extremely important. Smaller germination rooms may only use a small heater resulting in a large difference in temperature from one side of the room to the other. Allowing adequate air movement within the room will assist in reducing the temperature gradients that may be present. Adequate ventilation around each stack of trays will also reduce the amount of time taken to raise the temperature of the medium in the cells to optimum levels.



Each seed lot responds differently to temperature regimes.

Correct management of the temperature within a germination room is advantageous to any nurseryman. The result is better germination and emergence of seedlings, higher pull rates and better quality seedlings, all of which will result in better returns and financial stability.

By popular seed growers

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SAVE THE DATE

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