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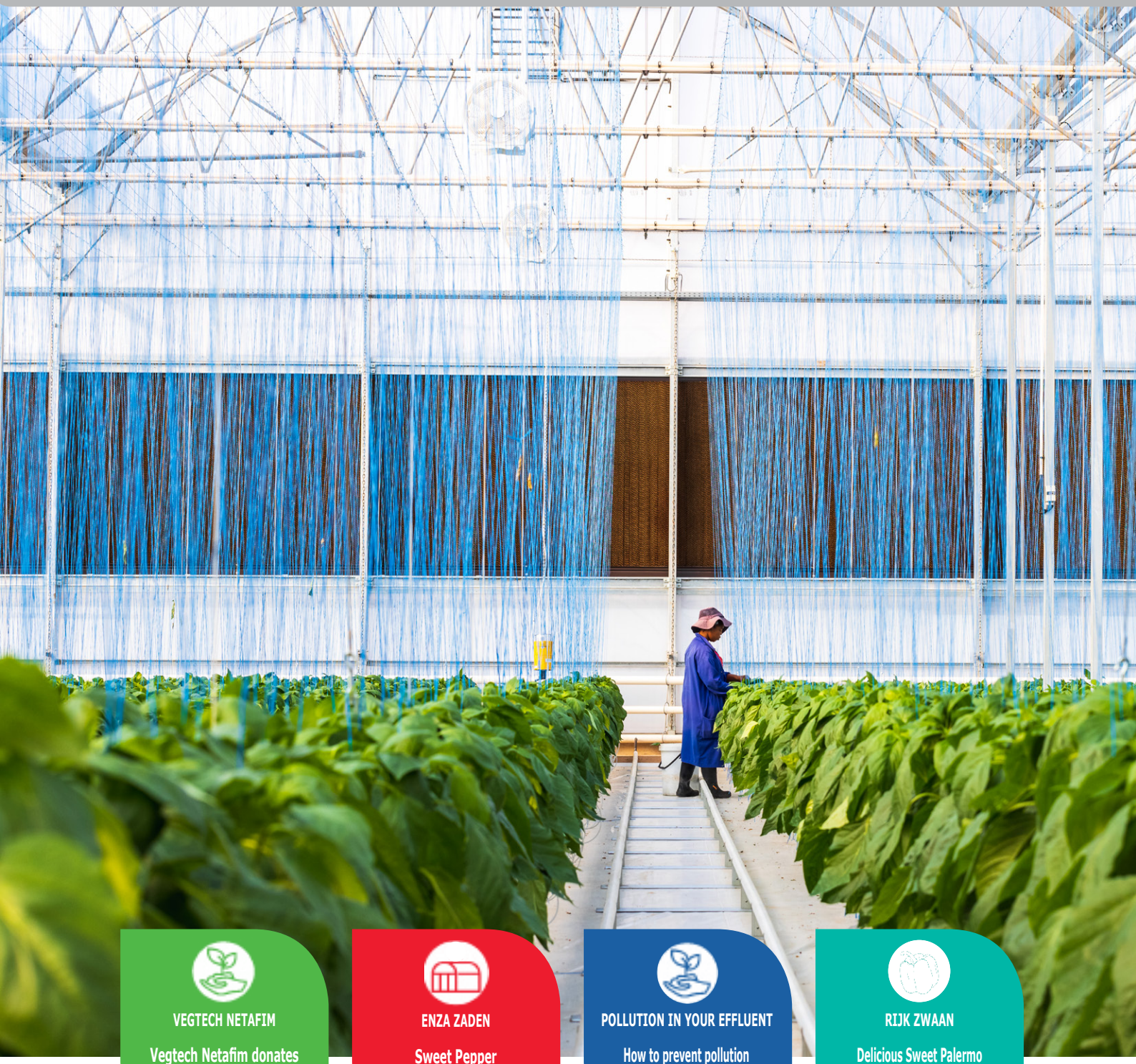

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SCRIPTURE

Fill your minds with those things that are good and deserve praise; things that are true, noble, right, pure, lovely, and honourable. Put into practice what you learned and received from me, both from my words and from my actions. And the God who gives us peace will be with you. – Philippians 4:8-9

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The Living Soils Community Learning Farm interns, farm managers and project manager Namhla Skweyiya inside the hydroponic greenhouse tunnel donated by Vegtech Netafim

VEGTECH NETAFIM DONATES HYDROPONIC GREENHOUSE TUNNEL

TO THE LIVING SOILS COMMUNITY LEARNING FARM IN SUPPORT OF FOOD SECURITY AND SUSTAINABLE AGRICULTURE

Ahead of World Food Day, commemorated on 16 October 2024, Vegtech Netafim, a provider of growing solutions, has made a significant contribution to local food security efforts by donating a hydroponic greenhouse tunnel valued at R220,000 to the Living Soils Community Learning Farm in Stellenbosch.

This initiative, which is directly aligned with this year's World Food Day theme: "Right to foods for a better life and a better future", is part of Vegtech Netafim's 2024 outreach program to promote precision agriculture and support community projects.

The Vegtech Netafim hydroponic greenhouse tunnels empower farmers and communities to grow fresh produce regardless of external factors like climate and soil conditions.

The donation will not only boost the farm's agricultural yields but also serve as a rich educational platform for the agricultural management interns, farm employees and managers, allowing them to explore precision agriculture techniques that promote sustainability and efficiency. The tunnel is equipped with precision farming technology that allows crops to be grown in a hydroponic medium, reducing water usage and increasing yield – a powerful combination that aligns with the principles of regenerative farming.

The Living Soils Community Learning Farm is a partnership project between Woolworths, Spier Wine Farm and the Sustainability Institute. The farm aims to improve long-term food security by providing a space to educate and empower young and emerging farmers, particularly women and youth, in food and farming livelihoods. Furthermore, the nutritious food that the farm grows

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is sold, exchanged and donated to stakeholders who provide direct food security initiatives to at-risk children and households

"As we approach World Food Day, this donation is particularly meaningful," said Namhla Skweyiya, Project Manager at the Living Soils Community Learning Farm. "Access to nutritious, sustainably grown food is essential for a better life and future, and this hydroponic greenhouse tunnel will greatly enhance our ability to provide that. It is also an excellent learning opportunity for our interns, who will be exposed to precision agriculture. This will expand their agricultural knowledge and improve their future employment opportunities while directly supporting our mission to grow more food with fewer resources."

The hydroponic greenhouse tunnel will allow the Living Soils Community Learning Farm to grow a variety of vegetable crops, including tomatoes and peppers in a partially controlled environment - all year-round. The technology enables farming in coir – an artificial hydroponic medium – rather than traditional soil, ensuring optimal growth conditions.

"We were looking for a cause that resonated with our values," said Barney Isralls, Vegtech Netafim Managing Director. "The Living Soils Community Learning Farm stood out because of the exceptional work they do within the community, and their partnership with reputable organisations like Woolworths and Spier Wine Farm assured us they were the right fit. By donating this hydroponic greenhouse tunnel, we aim to show how modern farming practices can not only improve productivity but also enhance the quality of life for the people involved."

In addition to donating the hydroponic greenhouse tunnel, Vegtech Netafim has committed to providing high-level technical and agronomical support to the farm, ensuring that the Living Soils Community Learning Farm team has access to the best resources for long-term success.

As the world focuses on the theme of "Right to foods for a better life and a better future" for World Food Day, this partnership between Vegtech Netafim and the Living Soils Community Learning Farm is a tangible step toward making that right a reality.

The farming technology introduced by Vegtech Netafim will empower the farm to produce more food sustainably, creating a direct positive impact on the availability of fresh, locally grown produce in the surrounding communities.

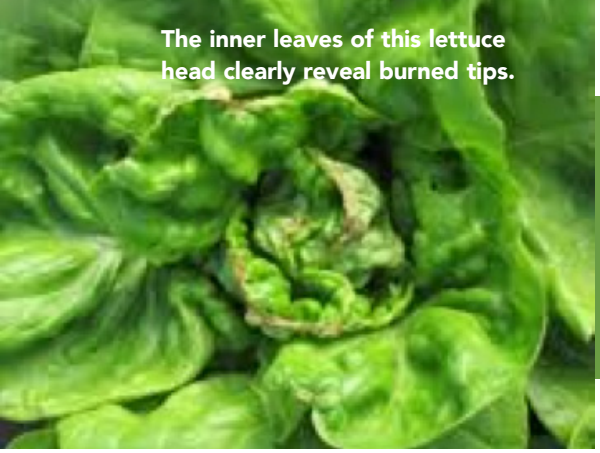
Living Soils Community Learning Farm Intern, Pheliswa Toto tendering to tomato plants growing in the hydroponic greenhouse tunnel donated by Vegtech Netafim

About The Living Soils Community Learning Farm

The Living Soils Community Learning Farm is a partnership project between Woolworths, Spier Wine Farm and the Sustainability Institute. The farm aims to improve long-term food security by providing a space to educate and empower young and emerging farmers, particularly women and youth, in food and farming livelihoods. Furthermore, the nutritious food that the farm grows is sold, exchanged and donated to stakeholders who provide direct food security initiatives to at-risk children and households.

About Vegtech Netafim

Vegtech Netafim is the leading supplier of controlled environment agriculture (CEA) solutions in southern Africa. We specialise in turnkey projects and offer an extensive range of agricultural products. Since 1992 we have completed over 500 greenhouse projects throughout Africa. Vegtech Netafim is part of the Orbia group of companies – a world leader in precision agriculture solutions. Our mission is to empower farmers worldwide to grow more with less, optimising crop yields and resource efficiency.



The inner leaves of this lettuce head clearly reveal burned tips.

WHAT CAUSES inner-leaf tip-burn on lettuce?

Horticultural experts state not all nutritional problems are caused by supplying too much or too little of a certain nutrient. "Tip-burn" of inner leaves is a common problem in hydroponics lettuce, where the margins of the young emerging leaves develop necrosis and burn.

The necrosis is from a calcium deficiency, but the actual problem is more the result of poor environmental conditions and water uptake. The lettuce receives an adequate supply of all plant essential nutrients in the hydroponic nutrient solution, yet you find in the centre of the head's leaves tip-burn.

Inner leaf tip-burn on lettuce appears as necrosis along leaf margins at the center of the head and is a physiological disorder involving calcium and water uptake. Calcium moves through plants passively and is carried with the flow of water.

As plants transpire and take up water, calcium is essentially "pulled" up from the roots and throughout the plant. Rapid transpiration promotes calcium uptake and distribution within the plant.

On the other hand, low transpiration rates decrease calcium uptake and transport. The growing tip of lettuce is enclosed by leaves that make up the lettuce "head," which block air movement and create a very humid micro-environment around the growing tip. This humid microenvironment results in low transpiration of the growing tip and reduces calcium transport to the new leaves, even if the outer leaves are transpiring adequately.

With low transpiration to the growing tip, insufficient transport of calcium causes the tissue along the young leaf tips to collapse and turn necrotic as the leaves expand. In this scenario, the problem is not insufficient calcium supplied to the root zone, but a physiological disorder related to poor transpiration of water and humid environmental conditions.

A similar type of physiological disorder occurs with fruiting crops such as tomato, cucumber, pepper, and eggplant, but is called "blossom end rot." Fruits have relatively low transpiration rates, and under rapid fruit growth and swelling, localized calcium deficiency occurs at the base of the fruit. The collapsed plant tissue also turns necrotic and resembles rotting.

Vertical airflow fans force air movement directly down to the crop. Drought stress, high soluble salts, and chemical phytotoxicity can also cause leaf tip-burn in lettuce and other leafy greens. However, symptoms of these problems tend to occur on older and mature leaves, whereas inner leaf tip-burn from poor transpiration and calcium transport occurs in young expanding leaves within the head.

Unfortunately, there is no way to salvage necrotic leaf tissue. But there are strategies growers can use to facilitate calcium uptake and prevent inner leaf tipburn. Fertilize with adequate amounts of calcium. First check that adequate calcium is supplied in the nutrient program. Supplying 40-50ppm of calcium in the applied fertilizer or hydroponic nutrient solution is a good starting point.

Depending on the source, the raw irrigation water may also contain calcium. Increasing calcium in the nutrient solution can help with calcium uptake and reduce inner leaf tip-burn problems, but remember the real problem is more often related to environmental conditions that affect water transpiration.

Weekly foliar sprays with calcium solution is a strategy to increase calcium concentrations directly in plant tissues. A starting rate is 400ppm calcium mixed using calcium chloride fertilizer salts (not calcium nitrate). Always trial on a few plants before the whole crop.

This strategy can be labour intensive and may leave residues on leaf surfaces, and is not often used in commercial practice for lettuce.

Low relative humidity and air movement increase plant transpiration and facilitate calcium uptake. Consider manipulating the greenhouse heating and venting systems to dehumidify the air during cool and cloudy weather. Increase use of horizontal and vertical airflow fans to improve air movement.

Conditions that promote rapid plant growth and leaf expansion promote inner leaf tip-burn, and shading/cooling under excessively high light and temperature conditions can help minimize risk. Avoid antagonistic effects from other fertilizer nutrients. High concentrations of ammonium nitrogen, potassium, and magnesium in the nutrient solution can block calcium uptake by roots.

Tips to prevent nutrient antagonisms include limiting ammonium to 15% of total supplied nitrogen and maintaining the ratio of calcium:potassium at approximately 1:2 and the ratio of calcium:magnesium at approximately 2:1 in the applied nutrient solution. Avoid high soluble salts. High soluble salts reduce the ability for plants to take up water and calcium.

If possible, maintain root zone electrical conductivity below 2.0 mS/cm. Select resistant varieties. Work with your seed supplier to select varieties specifically bred for lower susceptibility to inner leaf tip-burn.

By: Ryan Dickson

THE VIABILITY AND COSTS OF COMMERCIAL GREENHOUSES IN SA

There is much speculation on the viability of greenhouse production in our country. The best sources of obtaining facts and figures is from foremost greenhouse manufacturers, which offer one a basis for discussion with fully fledged commercial, but also smaller role players.

A large number of South African farmers view commercial greenhouse farming as an opportunity to increase profitability, maintain crop consistency, and to supply produce throughout the year without seasonal constraints. An obvious question that often comes to mind is: How much does a commercial greenhouse cost?

Determine cost

Determining the cost of your actual greenhouse structure is one thing (we'll discuss greenhouse structure types and their respective impacts on productivity shortly) but there are various other factors that come into play when conducting a feasibility study for your unique greenhouse farming operation.

External & Internal Commercial Greenhouse Cost Factors

Whether you're looking to diversify your existing farm, or start a completely new greenhouse farming operation, there are some obvious external factors that will determine whether you're limited or unrestricted in the choice of your greenhouse structure design. These include the availability of space, climate, and location-based logistics. Of course, these factors will ultimately have an impact on your investment spend.

Which crop?

Perhaps the most important consideration is the type of crop you'd like to grow. This, combined with the external limitations discussed, will shed light on the internal greenhouse factors that need to be addressed to varying degrees for your unique requirements, and the resulting costs thereof.

These internal factors include; Climate control, Irrigation, Fertigation, Labour, Automation and Natural or forced ventilation.

All these factors combined (external, crop type and internal) have a direct impact on the investment required to get your commercial greenhouse up and running, and therefore, future productivity.

Capital

Long-term thinking is a must when weighing up commercial greenhouse farming costs. The initial investment may seem sizable, but the long-term benefits of optimised crop yields and productivity may be substantial enough to make this investment a no brainer.

If the capital available for investment is limited, it's important to start your greenhouse development with expansion and growth in mind. Ensure you invest in a system that enables scaling for higher yields and productivity in the future through means of adding more advanced technology down the track.

The combination of these external and internal factors will also have a direct bearing on which types of greenhouse structures to consider in your situation. And they themselves, are an important factor in your long-term cost/profitability projections and decision-making process:

Designs Productivity & Profitability

When considering greenhouse cultivation, we think of efficiency in crop production, resources, space, labour, consumable costs and the list goes on… but one thing that can and will make all the difference in optimal yield performance is greenhouse structure design.

Studies have shown that there is a direct correlation between optimal yield performance and greenhouse structure design i.e. size, shape, height etc. (Reference: E. du Plessis (Masters of Science in Engineering).

Plastic Greenhouse Tunnels

Plastic greenhouse tunnels were only introduced towards the end of the twentieth century and became popular because of their low cost and ease of construction. Used in large commercial farming operations, varying qualities and thicknesses of plastic are available. The tunnels are also available in 6, 7, 8, 10 and 12m widths with 30 to 60m lengths and can be constructed as single span (standalone) or multi-span (joined) structures.

Multi-span Greenhouses

Recently there has been a focus on developing greenhouses with higher gutter heights. Glass greenhouses are constructed with a gutter height of 6 m and plastic covered greenhouses going up to 3.5-5 m. This has been shown to significantly improve the growing environment for greenhouse crops (du Plessis, 2016).

The structural design of greenhouses also influences the energy efficiency of a system. A study done by Djevic and Dimitrijevic (2009) showed that the type of structure can influence energy input per kg of product, energy efficiency and the productivity of a system with multi-span greenhouses being more energy efficient than single tunnel greenhouses.

Productivity: Low-Cost Tunnels vs Multi-Span Greenhouses

Herbert Stolker, grower consultant to a number of our top South African growers shared his statistics on yield performance:

The statistics make it clear that different greenhouse structure designs create different microclimates that can counter varying weather conditions, promoting optimal growing conditions as a result.

Source: Bosman van Zaal NL

THE SWEET PEPPER SOLUTION: From Greenhouse to Open Field

At Enza Zaden South Africa, we pride ourselves on offering high-quality sweet pepper varieties designed to meet the diverse needs of South African farmers, distributors, nurseries, and market agents. Our sweet peppers are recognised for their adaptability and consistent success across various growing conditions.

Whether you're cultivating under controlled greenhouse conditions, in net houses, or in open fields, our varieties are crafted to support your success from seed to harvest.

Superior Results in Greenhouse and Net House Cultivation

In greenhouse and net house production, Enza Zaden's sweet peppers demonstrate strong growth and resilience. The plants are bred to offer excellent canopy cover, protecting the fruit from harsh sunlight while facilitating consistent fruit set throughout the season. With strong root systems and improved disease resistance, our sweet peppers are ideal for high-tech environments where maximising yield and quality is essential. These varieties are optimised to perform well, even during low-light winter months, giving growers confidence in maintaining productivity year-round.

Enza Zaden is leading the market with strong intermediate resistance to powdery mildew (Lt) in both red and yellow sweet pepper varieties. This critical trait helps growers maintain high-quality yields in environments prone to mildew pressure, ensuring reliable results throughout the growing season.

High-Yield Sweet Peppers for Open Field Cultivation

For open field farmers, our sweet pepper varieties present an adaptable solution that can thrive in varying climates and challenging outdoor conditions. The plants exhibit strong vigour and continuous fruit set, contributing to reliable harvests

even in warmer weather. With their thick-walled, blocky peppers and enhanced resistance to common diseases, farmers can trust Enza Zaden's sweet peppers to deliver quality produce suitable for fresh market sales and bulk processing.

A Solution for Every Farmer

Enza Zaden South Africa's sweet pepper crop is engineered for growers aiming to achieve higher yields and profitability, regardless of their production system. With consistent fruit quality and strong disease resistance, our sweet peppers are an excellent choice for South African farmers looking to enhance their production and meet market demands.

Whether for greenhouse, net house, or open field production, Enza Zaden's sweet peppers provide reliable performance and top-tier quality, making them a go-to choice for growers looking to optimise their yield and profitability. With our commitment to innovation and sustainability, we continue to deliver sweet pepper varieties that meet the evolving needs of the South African market.

For more information on how our sweet peppers can benefit your farm or business, contact Enza Zaden South Africa today!

Author: Rene du Preez - Marketing Specialist at Enza Zaden Sub-Saharan Africa

Email: R.duPreez@enzazaden.com

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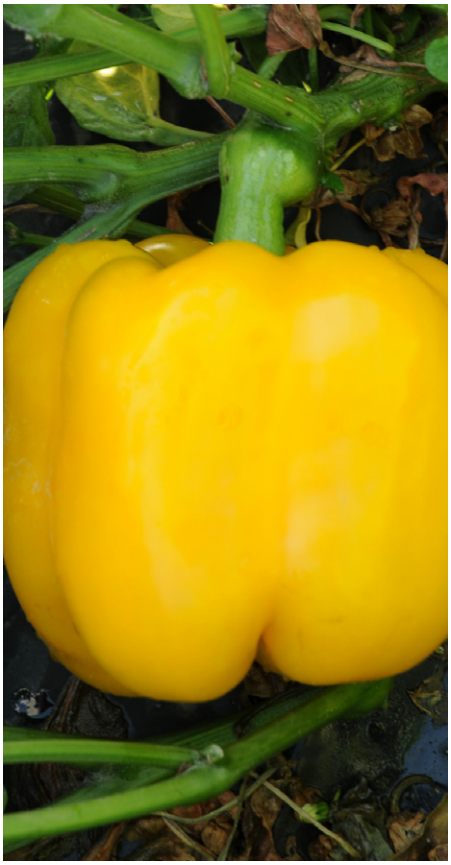



Sweet peppers


Tomatoes


Cucumbers


Brinjals


Seedlings – where it all begins.

GROWING ALTERNATIVE GREENHOUSE CROPS?

Generally, there are relatively few vegetable crops grown commercially in greenhouses. Tomatoes, cucumbers, peppers and leafy greens probably account for most of all vegetables produced commercially in greenhouses.

Occasional reports on production of such crops as watercress, herbs, melons, and strawberries make up the remaining small percentage of production.

An initial reaction to this might be: If we can successfully produce tomato, cucumber, lettuce and peppers, then certainly we can produce other types of vegetables. The answer is yes. However, there are several considerations that require deeper analysis. When considering an alternative crop in the greenhouse, each of the following elements should be completely researched to identify the potential feasibility.

Firstly, consider the growth characteristics of the crop. Producers need to realise that the yield a greenhouse may give only relates to producing vegetables in cool seasons when they ordinarily would not be grown.

Therefore, cool-season crops are virtually eliminated as economically feasible for greenhouse production due to competition with field-grown produce. Plants that require several square meters per plant and are not conducive to trellising and/or pruning would not make logical choices due to the reduced number of plants that could be grown in a unit.

Many fruiting plants have imperfect flowers and require pollen to be physically moved from one flower to another, or sometimes from one plant to another. Such a process would require excessive labour; however, today commercially available bumblebees or technical instruments can solve this problem.

Some crops require relatively long periods of vegetative growth prior to producing a marketable product. Since greenhouse production is expensive, optimum produce volume per square meter per unit of time is of paramount importance.

The volume/space/time relationship is just one consideration about production volume. The second element is the volume-to-price relationship. The volume-price relationship is what have made tomato, cucumber, lettuce, and pepper viable crops. The product needs to be a relatively high-value crop and capable of producing good volume.

Volume can generate a greater return on investment even if the per-kilogram return is not as great. Very few crops have a high-volume potential and high value in the market.

Some crops can be made profitable by creating a value-added aspect. For example, various lettuces and greens by themselves might not be very profitable. However, when packaged as a mixed salad there is more value to the product and potentially more profit.

Timing of production is critical for some markets. The seasonal volatility of produce prices only emphasises the need to research the market trends to assist in determining viable marketing periods. After locating potential market windows, consider the crop again. Can it be grown successfully at that time of the year?

Some crops have specific requirements, such as minimum day lengths, temperatures, etc, that could not be economically met to produce the crop during some periods of the year. An in-depth study of the crop's environmental requirements and responses could be very important in avoiding a potential problem.

The market locality or proximity also might play a role in the decision-making process. A local market might be lucrative enough to encourage a grower to produce a crop that might not be profitable for wholesale market channels.

If a grower gets past all the above hurdles and still has a viable alternative crop, there is hope. However, growers will need to deal with the following areas of concerns.

Growers must consider labour. To some extent all crops require labour. Production in a greenhouse requires intense management, and operations must be timely. Certain cultivars require much more labour than others. An example of this is 'cherry-type' tomatoes.

Most cherry tomatoes sucker profusely and repeatedly at the same axils, which means suckering and pruning up and down the entire vine all season long versus once for the standard beefsteak types of tomatoes.

Another example is the sequential ripening of cherry tomatoes on each fruiting cluster. This characteristic results in picking over several feet of vine at each harvest. The cherry tomato fits all the other parameters of a good crop until the labour element is factored in.

The last consideration is certainly not the least, nor the final one, but should be seriously weighed. When considering any alternative crop, make an exhaustive effort to obtain as much technical and supportive information as possible and identify sources of help including service providers' extension employees, local industry members, and greenhouse supply representatives. **By: WD Thomas**

HOW TO PREVENT POLLUTION IN YOUR EFFLUENT

In the past Dutch growers, who allowed nutrient rich water to run from their farms, were contributing to chemical pollution and the increased incidence of water weeds in their canals and rivers. Strict laws were introduced to decrease this environmental pollution, by restricting the release of nutrient-rich water from production units.

Due to intensive research projects on recycling, they succeeded to reach this goal in the year 2000. Two problems were solved in this process: The first was to monitor and adjust ions in the nutrient solution, and the second to sterilize the recycled solution. Sterilization options will be discussed in the next edition, allowing a few more words on the issue of plant nutrition here.

Prevent the accumulation of sodium (Na) and chloride (Cl)
Feeding water with low Na and Cl levels must be used when nutrient solutions are recycled (closed system) in order to prevent the accumulation of these ions. The Dutch overcame this problem by building plastic lined reservoirs, filling it with rain water from their glasshouse roofs. By mixing Na- and Cl-rich water with rainwater, the Na and Cl concentrations were lowered to safe levels. Since low EC crops such as roses can only absorb 5 ppm Na and 11 ppm Cl, these are the highest levels that may be allowed in the feeding water for roses in a 100% closed system.

A saline tolerant crop such as tomatoes can remove 16 ppm Na and 32 ppm Cl, allowing tomatoes to be recycled with feeding water containing these, or lower, Na and Cl levels. Should water with higher Na and Cl levels be used for a limited recycling period (until the red lights start flashing) saline sensitive crops should be flushed as soon as root zone levels reach 69 ppm Na or 107 ppm Cl. Most greenhouse crops will be unaffected with Na levels below 115 and Cl below 178 ppm. Saline tolerant crops such as tomatoes will be able to withstand levels of up to 184 and 284 ppm Na and Cl respectively. Should these levels be exceeded, yield and quality losses will occur.

Adjusting nutrient levels
As a crop develops from the vegetative to reproductive stage, or with a change in climatic conditions, its nutritional needs change. The use of leaf deficiency or toxicity symptoms to identify nutritional problems is ineffective. It is impossible to avoid yield and quality losses with this approach, even by using quick petiole sap measurements as aid. The use of nutrient foliar sprays should not be necessary. Root zone analyses, developed in the Netherlands during the last few years, can help growers to identify nutritional imbalances before it is reflected in the leaves and before damage can be done to the yield potential.

This procedure is used by the Dutch and the Belgians, serving areas with high densities of growers. The laboratories send technicians to take root zone samples every week or two. The results and suggested changes to nutrient mixes are E-mailed to the growers the following day. The duplication of such a system under South African conditions may be impractical at this stage, but the same principles may be adapted to improve our nutrient managerial effectiveness.

Preparing a root zone analysis is a must for recycling, but it can also be useful to optimise nutrition in a free-draining system. The procedure starts with a chemical analysis of the root zone solution. One fresh sample from the drainage tank in a closed system, or a mix of 20 fresh sub samples, taken from growing bags in a drain-to-waste system, should be analysed at least monthly. Since changes in the ammonium: nitrate ratio may occur during storage, these samples should be analysed as soon as possible.

Apart from regular pH and EC checks, root zone analyses are used to detect deviations from preset root zone norms, thus, allowing the plants to communicate with their growers. Before this can be done, the EC and nutrient levels of the sampled solution should be adjusted to match the EC of the norm solution. **This procedure is described in a book: 'Nutrient solutions and Greenhouse management' only available from Dr. Nic Combrink: Mobile: 082 6038264**

WHAT CAUSES CRACKS ON PEPPERS?

One of the most common physiological problems on sweet peppers in South Africa is called cracking (also called sugar crack). Cracks can be small or large on the fruit shoulder, the sides or the blossom-end of fruit. Fruit with fine, inconspicuous cracks are often marketed, especially during times of short supply. Fruit with deep unattractive cracks are not marketable.

In contrast to other fruit where cracking is a problem, the fruit of sweet peppers are hollow. This makes sweet peppers more susceptible to crack since the fruit is more prone to shrinking and expansion.

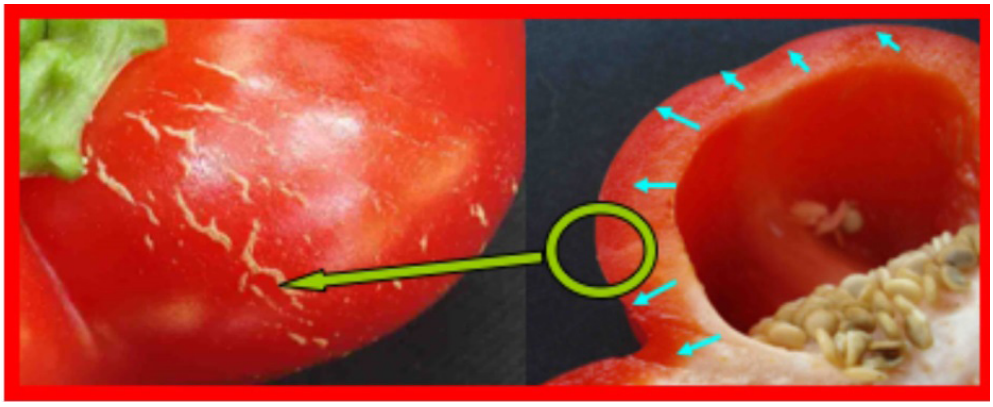
Sugar cracks start off as microscopic cracks in the cuticle (outer wax layer) when the fruit start turning into colour. Initially the cracks are in the cuticle only and they can be observed by means of a microscope. As the condition develops, the cracks become wider, tear through the underlying epidermal layer and later through the deeper lying parenchyma cells.

At this stage, cracks can be observed by the naked eye, especially if a magnifying glass is used. The fruit tissue responds by secreting a corky wound callus to seal the wound, thus making cracks very conspicuous and the fruit unmarketable.

Fruit cuticle crack only in mature stage
The cuticle is a non-living, protective layer covering the surface of the fruit. It protects the fruit wall cells against dehydration and pathogens and it is formed through secretions from epidermal cells. Although the cuticle is non-living, its contents changes as the fruit develop.

When small fruit develop and the circumference increases on a daily basis, the cuticle is elastic. Should cracks form in the cuticle at this stage, they are filled by secretions from the epidermal cells. By the time fruit reach maturity and start to colour up, the circumference remains unchanged so less wax is secreted into the cuticle.

Researchers also think that the contents of the cuticle may change as it becomes less elastic and more penetrable by water.



Causes of cracks on sweet peppers
The primary cause of cracking is expansion of the fruit wall during the night and shrinkage during the day. The daily shrinkage and expansion weakens the cuticle of mature fruit.

During the day water is lost through transpiration. During the night water is taken up by the roots and transported to fruit. This causes a build-up of pressure (turgor) in the fruit wall. Because transpiration does not take place at night, the turgor pressure can be so high that the cuticle, and later the epidermis crack.

Developing fruit are less prone to crack partly because the cuticle is supplemented continuously and partly because the wall is thin and contains little sucrose. As fruit develop, the fruit wall becomes thicker and when they are ripe (red or yellow) the sucrose contents can be as high as 20%.

The high sucrose content leads to a low water potential and causes water to flow into the fruit during periods of low transpiration – when it is cool or during the night.

Plant characteristics associated with crack
Research in Israel and elsewhere, has shown that cracking can be associated with the following characteristics:

Genetics - Some varieties are prone to crack.
Thickness of the fruit walls - The thicker the fruit wall, the more the water it can hold and the higher the pressure that can build up at night.

Because breeders select against cracking, not all varieties with thick walls are prone cracking.

Environmental factors associated with cracking
Reduced transpiration results in less water flowing from fruit to leaves and this result in pressure building-up in the fruit walls.

High relative humidity is the main cause of low transpiration during the night. Especially during periods when minimum temperatures tend to be low, typically during spring and autumn. Transpiration is also low during cool or cloudy days.

Transpiration is low when the leaf canopy is insufficient. This can happen when a plant is pruned incorrectly and too many leaves are removed, or when plants loose leaves as a result of leaf diseases.

Water stress during the day cause a net flow of water from fruit to leaves because it becomes difficult for roots to take up water from the soil, yet transpiration takes place for temperature control.

Water supply during hot, dry days is critically important to maintain the water balance in sweet peppers.

Direct irradiation. The temperature of fruit exposed to direct sunlight, can be 3°C higher than shaded fruit. Researchers speculate that increased temperature can

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HOW TO CONTROL FUSARIUM ON GREENHOUSE PLANTS

Fusarium causes a lot of greenhouse growers headaches. The fungus ensures that crops such as lettuce, tomato or phalaenopsis become ill or even die. Fusarium can be controlled with plant protection products, but the number of authorized products is shrinking.

Fusarium is a pathogenic fungus and can cause damage both above and below ground. Fusarium rot affects roots of plants: vascular bundles get clogged by fungal growth and can no longer transport water and food. The result: the crop withers or even dies. Especially in the cultivation of lettuce this caused many problems in recent years. Contaminated soil or substrate must therefore be properly disinfected.

Two solutions have often been applied to a Fusarium infection: removing diseased plants or using chemicals. The latter solution is becoming increasingly difficult: due to stricter legislation fewer chemicals are permitted, Fusarium is becoming more resistant to some drugs and there are many different variants of the fungus. In addition, the use of chemical agents in the vegetable industry encounters objections in society.

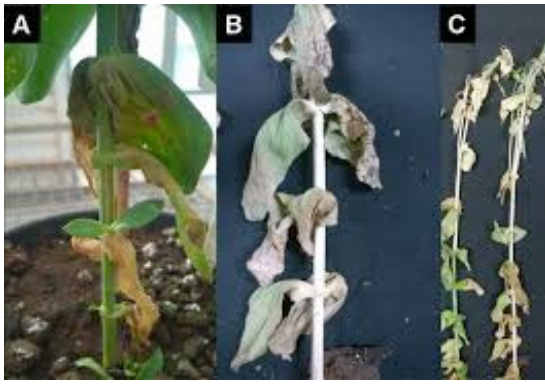
It is therefor high time for proper alternatives. That is also the opinion of growers of lisianthus and phalaenopsis. The University of Wageningen has started with research trials on Lisianthus and phalaenopsis.

Three routes are being examined. First of all the use of biological crop protection products to combat Fusarium. For this, use is made of resources that are already commercially available.

The second route is to encourage the plant to defend itself better against the fungus by using so-called elicitors of induced resistance.

And the third route focuses on soil resilience: can the soil be manipulated in such a way, for example by adding organic substances, that there is less chance of infection with Fusarium?

The outcome will be published in a future edition of Undercover Farming. Meanwhile, this information will hopefully set the minds of the above-mentioned flower types producers thinking about their greenhouse disciplines to combat Fusarium! **The research is done by Dr MA Streminska.**



Cracks on peppers from page 12

lead to increased water potential that in turn lead to more water flowing out of the fruit to leaves.

Management to reduce cracking

Plants must at all times receive enough water. This will reduce water flow from fruit to leaves under conditions when the rate of transpiration is high.

Plants must have a good foliage cover at all times so that fruit are protected against direct sunlight and also to make sure that the surface for transpiration is optimal.

Reduce the fruit load should some leaves be lost as a result of pests and diseases, even if it means that green fruit are harvested.

Provide for good ventilation, especially in plastic greenhouses. During the day, ventilation removes humid air around leaves resulting in improved transpiration. During the night, ventilation helps to prevent high relative humidity.

The risk for fruit cracking increases in spring and autumn weather. Minimum temperatures tend to be low, while daily maximum temperatures and transpiration are high.

Choose varieties less prone to cracking.

Keep in mind that thick fruit walls are more prone to cracking.

Management to reduce fruit cracking cannot be based on one or two factors. It should be an integrated approach taking all the possible factors into consideration. **Sakata**

TRAINING AND PRUNING
TOMATO PLANTS FOR OPTIMAL YIELD

Tomato plants are trained to one stem that is physically supported by twine hanging from an overhead wire. The wires are located above the rows and run the length of the greenhouse and are usually placed 30cm beneath the gutter height.

The twines are attached to the young tomato stems using plastic "tomato clips" at about one week after transplanting. It is important that the young tomato plant be firmly rooted in the sawdust bag before it is clipped to the twine.

The first plant training procedure after clipping the plants to the twine is to lean the plants in the direction that they will eventually be trained along the row. It is important to have the plant leaning before the first fruit set and begin to fill, as this allows for the all fruit to develop beneath the leaned stem.

By contrast, if the plants are allowed to set fruit while still vertical, the fruit will start to develop on the same side of the stem where the truss originates. As the plant grows in height and has to be leaned the trusses could completely twist off under the weight of the shifting fruit. The heavy fruit will all shift to the low side of the leaned stem.

Greenhouse tomato plants have tremendous growth potential with vines reaching up to 12 metres (40 feet) long during the growing season. Because of this potential the plants have to be properly pruned and trained to maintain an optimum plant balance and avoid unruly "wild" plants that will develop if the laterals are not pruned, resulting in excessive vegetative growth and development of multiple stems.

Tomato plants are fast growing under optimum conditions. Pruning and plant training are critical to plant management if an optimum plant balance is to be maintained that will result in high yield.

Pruning and plant training are ongoing tasks that must be scheduled to keep pace with the growth of the plants. There is really no catching-up with plants that have been allowed to grow too long without pruning. The plants can be brought back into balance, but not without some associated yield loss due to the plant resources which were directed into lateral stems that should have been pruned earlier.

The standards for how to prune and manage the plants are set by the head grower and the implementation of the pruning standards is accomplished by the workers according to a schedule. In larger greenhouses where there are a number of workers, efficiency of the plant pruning and handling tasks can vary by worker. Efficiency of workers improves when they are motivated; work organization can have a significant impact on motivating workers.

Assigning each worker an area of the greenhouse in which they are personally responsible for all the pruning and plant handling can help workers establish a sense of pride through ensuring that the plants are maintained to the highest standards set by the head grower.

This also establishes an atmosphere of friendly competition as workers strive for the recognition of their peers for their personal high standards that are demonstrated by the performance of their section of the crop. This atmosphere of competition can be managed to help solidify a strong team of workers especially when workers are paid bonuses based on the performance of the crop.

By: Steven.Dalpe, horticulturist.

Plants supported by twine to an overhead wire.

Plastic support clip being placed around a tomato stem.

Steak with SWEET PALERMO salsa

With this impressive dish, you will definitely dazzle your guests with your cooking skills. You can serve it as a main dish accompanied by some other vegetables or fries, or as an appetiser to share.

INGREDIENTS

1 red Sweet Palermo, finely chopped
1 tbsp olive oil for frying
2 cloves of garlic, finely chopped
3 sprigs of flat-leaf parsley, roughly chopped
2 tbsp capers
4 tbsp extra virgin olive oil
3 steaks (Rump or sirloin will do)
25 g butter
50 g rocket
Salt and pepper

PREPARATION

Heat a little olive oil in a pan and fry the Sweet Palermo until softened. Add the garlic and continue frying for a few more minutes. Transfer to a dish and mix with the parsley, capers and olive oil to make a salsa. Season to taste with salt and pepper.

Remove the steaks from the fridge half an hour beforehand, and pat them dry with some kitchen paper just before frying them.

Heat the butter in a pan until it turns golden brown. Add the steaks to the pan and fry over a high heat for one minute on each side. Reduce the heat a little and then continue cooking, turning the meat frequently, and season to taste.

Remove the steaks from the pan, cover them with aluminium foil and leave to rest for 2 minutes before slicing the meat.

Arrange the rocket on plate, place the sliced meat on top and garnish with the Sweet Palermo salsa.

SEASONAL GERMINATION of peppers and tomatoes

During the cooler months, seedling nurseries are often asked to produce tomato and pepper seedlings for producers in warmer areas, or those wanting to get into the market early. Unlike summer seedling production, the management of winter seedling production requires much more management to ensure maximal protection of the seed and seedlings from cold and the damages it may cause.

A 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 management of the germinating seed is essential to ensure maximum germination and subsequent development of the plant. Tomatoes require the following temperature conditions for germination:

Not only does the temperature impact the actual germination process, but also the rate of seedling emergence:

This information highlights 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.

Seed companies usually provide with their tomato and pepper seed what is termed a range test. The range test describes the effect of various temperatures on the germination of the lot. Each seed lot responds differently to temperature regimes and therefore, each seed lot is tested accordingly.

The importance of these range tests is that it illustrates how that lot needs to be treated to achieve the best germination and emergence of the 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.

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

Table 1: Seed Germination Temperature for Tomatoes (Benton Jones, 1999)

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

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

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

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SA BLUE BERRY PRODUCERS Optimistic

Blueberry producers in South Africa, although relatively young in existence in comparison to other countries, has seen a steady increase in production and exports.

Blueberry producers in South Africa, although relatively young in existence in comparison to other countries, has seen a steady increase in production and exports.

For 2024 growers are optimistic about the country's output, anticipating a 10% growth in exports and expecting to achieve its target of 25,000 tons of blueberries, a magnificent increase from the 2023 exports of just over 22,000 tons.

Although South Africa was confronted during 2023 with challenges because of a long winter and delayed harvest particularly in the Western Cape, Brent Walsh, CEO of Berries ZA anticipates a fruitful season and is looking ahead at exploring new trading markets and marketing new blueberry varieties for both local and international markets.

Walsh remarked they are supplying local markets until July-August, since that's when the industry sees an increase in supply in Northern South Africa. "After that, production starts to move south of the country into the Western Cape and then by September you'll see a lot of the harvest happening," he said.

Main export seasons for blue berries are October, November, and halfway through December. Therefore, for a while one will observe only some berries marketed. Berries from Zimbabwe are imported currently as they're even earlier than locally produced.

According to Walsh, although there was a significant worldwide shortage of blueberries in the market last year, which led to an overall price markup, the local industry didn't do badly by comparison. "We were about 12.5% short on what our exports were the previous season, but I think the pricing certainly helped growers and exporters in terms of the commercial aspect," he explained.

Exports should be back around the 25,000-ton mark and some improvements in the logistics channels, specifically the container terminal management, which caused uncertainties before.

Walsh reported the price uptick helped BerriesZA do more air freight than sea freight and helped with logistics challenges along the way. He urged the fresh produce industry to work together with the organization to find a reasonable solution.

The organization right now is looking to develop new varieties and reach new markets. Said Walsh, "Our growers rely on a relationship with the nurseries who can provide them with the genetics from development houses, and those are all internationally marketed blueberries; they're certainly not unique to South Africa."

Walsh also reported an improving relationship with Middle Eastern countries, which are seeing a significant increase of 50% in blueberry imports from South Africa year-on-year. However, India is the nearest new market on the horizon and BerriesZA will try to begin chasing the Chinese market as soon as possible after that door is open. **IBO**

◀ Continued from p 16

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 many 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.

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. Management pays!

HOW CALCIUM affect your plants

Calcium is probably the most intricate component a greenhouse grower has to contend with in crop production. Difference in advice leads the grower often down the wrong track and he may lose crop, which he cannot afford.

Calcium is a mineral and when looked at under a microscope, is made up of multi layers of almost block form particles. This substance in its usage form must be kept in dry containers which are air tight as moisture can deplete its function. It is estimated that 3.7 to 6% of the Earth contains Calcium. The human being contains 1.5 % Calcium in his body of which about 90% is located in the skeleton.

In our soils, Calcium is adsorbed into the clay complex and therefor usually higher in clay-type soil as in sandy soils. Calcium in a carbonate form will change the pH of the soil – depending on the type of soil and availability, it could add to the plant's quality or vigour.

The optimal position to be in as a producer, is to balance out your crop's needs with the correct percentage of Calcium versus Potassium and Magnesium depending on the soil's composition.

In greenhouse growing media, the different media or mixes thereof calls for a different approach of application percentages to optimise adsorption of Calcium by plants.

A lack of Calcium in the water supply may be detected when for instance dishwashing liquid does not foam when poured into the kitchen sink or a lack of precipitates in kettles or on windows. This is a simple example of detecting low Calcium in water.

Plants by nature have difficulty in take-up of Calcium and when it absorbs too little Calcium, plant deficiencies like blossom-end rot is visible for instance on the underside of tomatoes or sweet peppers. These occurrences are sometimes mistaken as sunburn but if it was caused by sunburn, the spots would have been at the top of the fruit. This lack of Calcium disease is also visible on lettuce with tip-burn and cucumbers with the leaf umbrella effect.

Calcium is taken up by the root system and continues up in the plant through the xylem structure, but then at the apex of the xylem it is dropped where it is without translocation downwards in the phloem of the plant. This then causes Calcium deficiency. A very small percentage of the Calcium that is in the downward trend remains in the cell walls of the plant but it is actually needed in the fruit production parts of the plant.

The mission of the farmer is to get the Calcium to move where it is destined to be – the fruit tips. Calcium though, is extremely affected by other elements such as Potassium, Phosphate and Nitrogen due to nutrient antagonism (Mulders chart). Therefor, if the producer does not have the right fertigation mix for the different plant types and even varieties, he will have to obtain the

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information from his seedling grower, seedsman or consultant as they are the ones who can advise him to follow and to optimise the program.

Temperature and humidity play a major role in Calcium flow in the plant in a greenhouse. The movement of Calcium is controlled by environmental conditions and the farmer in a greenhouse can manage this by climate control.

Care must be taken when foliar feed applications are made at nighttime as the temperature and humidity of the plant and the greenhouse must be correct and droplet size of the spray is crucial. The system must be fine-tuned to manage this application. This way of obtaining Calcium in the fruit set areas of the plant works well, but again, only with careful management.

One must realise that the healthier a plant grows and the better it produces good quality fruit, the higher the Brix count will be. If the Brix should be around 15 and the producer finds it to be at 5 or below, he must immediately realise he has a nutrient imbalances and act accordingly.

The simple piece of equipment required to establish Brix on your plant is readily available. Brix count in greens should be between 8 to 10 but in berries and fruit rise towards 15 to 18 Brix.

The message is thus clear – the healthier crop the less calcium absorption problems might occur Farmers can Google 'Brix on crops' and find the ideal Brix count for his crop.

The pH measure of the plant is 6.2 to 6.4 to be to be healthy and productive. If the score is lower, the plant under-produces. The EC of the plant should also be taken into consideration. These tests should be kept record of for future cropping purposes.

Plant transpiration is an important factor in calcium assimilation. If one finds it hot, cloudy or any quick environmental changes outside the greenhouse, be reminded what the plant experiences inside the greenhouse and go and check whether all programs are in place to keep stress away from your production system.

As far as Calcium is considered, farmers are advised to live close to their plants as there are so many variables that can go wrong if the producer does not beforehand find the correct program for his particular situation in order to avoid mostly unnecessary losses.

Source: Lindi Grobler
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