ucf Undercover farming

NOVEMBER/DECEMBER 2025 | VOLUME 22 NO 6 | ★★★★★ | R45.00 PER ISSUE

GREENHOUSE PRODUCTION TO ENSURE FOOD SECURITY IN SOUTH AFRICA

Agriculture in South Africa faces numerous challenges, including water scarcity, unpredictable weather conditions, and soil degradation. Greenhouse farming has emerged as a potential solution to these problems by providing a controlled environment for crop growth.

In this editorial, it explores the benefits of greenhouse farming, discusses the various growing media and substrates, and highlights advanced irrigation and temperature monitoring systems. One must emphasize the importance of consulting with experts like Martin Dale Seedlings, amongst others for advice and greenhouse solutions.

Benefits: Extended Growing Season
Greenhouse farming enables growers to overcome the limitations of soil, water, and climate, which are significant challenges in South African agriculture. By providing a controlled environment, greenhouses allow for an extended growing season, enabling farmers to cultivate crops throughout the year.

Improved Crop Yield and Quality
Greenhouse production in South Africa has proven to be more profitable than open field production, with tomato, cucumber, and pepper being the most profitable crops. Greenhouses protect crops from adverse weather conditions and pests, leading to improved crop yield and quality. For instance, Mahlangu et al. (as early as 2016) found that soilless systems (often used in greenhouses or tunnels) resulted in significantly higher yields compared to traditional soil-based systems, with improved fruit quality and reduced disease incidence.

Growing Media and Substrates
A key aspect of successful greenhouse farming is selecting the appropriate growing media and substrates. The choice of substrate can significantly impact crop health, yield, and resource efficiency. Some common substrates used in greenhouse farming include:

Coir (coconut fiber): A renewable and environmentally friendly substrate, coir has excellent water retention and air porosity, which promotes healthy root growth.

Perlite: A lightweight, porous volcanic rock that improves aeration and drainage in the growing media, perlite can be mixed with other substrates to enhance their properties.

Vermiculite: A lightweight, expanded mineral with excellent water-holding capacity, vermiculite is often used in combination with other substrates to create a balanced growing medium.

Peat moss: A widely used organic substrate, peat moss has high water retention and good aeration properties. However, concerns about the sustainability of peat extraction have led to increased interest in alternative substrates.

Rockwool: A popular inorganic substrate, rockwool provides excellent water retention, aeration, and insulation, making it suitable for various crops and hydroponic systems.

Advanced Irrigation Systems
Efficient water use is crucial for sustainable agriculture, particularly in water-scarce regions like South Africa. Greenhouse farming enables farmers to implement advanced irrigation systems, such as drip irrigation and fertigation, which optimize water use while minimizing waste. These systems deliver water and nutrients directly to the plant roots, improving nutrient uptake and reducing water evaporation. By utilizing advanced irrigation systems, greenhouse farmers can conserve water resources and increase crop productivity.

Temperature Monitoring and Control
Temperature is a critical factor in plant growth, and greenhouses offer the opportunity to maintain optimal growing conditions year-round. By employing temperature monitoring and control systems, farmers can ensure the greenhouse environment remains within the ideal temperature range for their crops.

Automated climate control systems can regulate heating, cooling, ventilation, and shading to maintain the desired temperature and humidity levels. This level of control allows farmers to optimize crop growth and maximize yields.

Investing in greenhouse farming can bring significant benefits to South African farmers, including increased yields, improved crop quality, and resource efficiency. However, making the transition to greenhouse farming requires careful planning, knowledge, and access to quality greenhouse solutions.

By partnering with seedling growers, the likes of Martin Dale Seedlings, growers can receive expert advice on greenhouse design, growing media, substrates, advanced irrigation systems, and temperature monitoring and control. Their experience and dedication to sustainable agriculture make them the ideal partner for farmers looking to embrace greenhouse farming.

Still, greenhouse farming offers a viable and sustainable solution to the challenges faced by South African farmers. By adopting greenhouse technology and partnering with experts, farmers can optimize crop production, reduce environmental impact, and contribute to a prosperous future for South African agriculture. **By: Martin Dale**

PROPRIETOR I ADVERTISING

CONTACT DETAILS:

EDITOR:
Johan Swiegers
Cell: 082 882 7023
Email: editors@undercoverfarmingexpo.com

GENERAL MANAGER:
Marion Oosthuizen
Cell: 071 639 9300
Email: marion@undercoverfarmingexpo.com

DIGITAL MARKETING:
Tiaan van Straten
072 067 8046
tiaan@undercoverfarmingexpo.com

Cynthia van Straten
079 963 3698
cynthia@undercoverfarmingexpo.com

Nicolene Oosthuizen
082 630 1496
nicolene@undercoverfarmingexpo.com

DESIGN:
Yolandé van Zyl
Cell: 082 775 1002
mandidesigns2018@gmail.com

FOLLOW US ON:

https://www.facebook.com/Undercoverfarming

https://www.instagram.com/undercoverfarming?igsh=MW8zdjU5NWd4ZDFyYw==

https://www.linkedin.com/company/undercoverfarming-magazine/

https://twitter.com/UNDERCOVERFARMING

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

ucf Undercover farming

Contents

INSIDE ...

Obtain your Undercover Farming magazine digitally!

Subscription details on p19

From all of us at Undercover Farming magazine: Blessed Christmas and Prosperous New Year!

WHY SHADE NETTING Is Beneficial to Producers

With the first glance at the headline above, many readers will immediately question its validity, remembering the recent harsh storms in areas where specifically fruit trees stand on farms. However, a closer look at the outcome of the producers who use shade net over their orchards, much less losses occurred.

There are multiple benefits that shade netting can offer farmers, that will ultimately improve their crop yield.

Benefits

Heat: By preventing a certain percentage of the UV rays from shining on the crop, the plants will have a lower chance of experiencing burn damage. The temperature will also decrease, and the ground will not dry out as quickly.

Water Usage: As the ground retains more moisture and humidity, it will be less needed to water as frequently and thus water usage will decrease. This can, of course, increase cost-efficiency in the long run.

Wind: Shade nets can also soften the blow from the wind, ensuring that the crop does not experience damage from harsh winds (think about how the winds in Cape Town could affect certain fragile plants).

Light Control: Some plants prefer a larger exposure to light whereas other plants flourish in the shade. Thus, depending on the thickness of the shade net, the preferred conditions can be created.

Pests: Pests such as bugs or locusts that feed on the crops in question can be kept away from the plants.

Diseases: Some diseases such as leaf spot and citrus canker can be prevented using shade netting.

Why Different Colours?

There are different colours of shade netting that one can choose from. One might think that this is an aesthetic choice; however, it is a practical one. Each colour has different uses, effects, and features.

Green: This is a very common shade netting colour and is a good middle ground as it does not absorb, nor reflect a large amount of heat and UV rays.

Blue: This is the colour that scatters light while generating heat for the plants below. It does, however, only let in blue light.

Black: As you might imagine, black absorbs an immense amount of heat while reflecting the UV rays away from the crop.

White: White reflects both light and heat, providing a well shaded and cool environment for its crop.

Shade Netting Density

There is a wide variety of shade netting densities, and it is important to consider which density you apply to your crop, as this can determine whether your crop is successful or not.

The different percentage densities typically available are listed here.

20%-30%: As this is the most porous variant of shade netting, it should be used on crops that flourish in heat and prefer a lot of light. This can include crops such as peppers and tomatoes.

40%-50%: This density is not typically used for food growth as it is suited to flowering plants such as orchids, begonias, and the like.

60%: This is a shade net density that is often used for crops that are quite delicate. This can include lettuce, which can wilt and burn easily.

70%-90%: This density is perfect for plants that would typically grow in shady areas and suffer from high light exposure. These can include plants such as ferns.

Best Shade Netting for Vegetables in South Africa

When deciding on shade netting that is specially manufactured for agricultural purposes it is important to choose a provider that takes your crop into consideration. PlusNet is such a shade netting provider. They focus on what a crop needs to flourish and tailor their products to improve spectral transmittance while providing the perfect amount of lighting and protection.

Source: AgrifoodsSA

CLEANING AND DISINFECTING THE GREENHOUSE AFTER FINAL HARVESTING

There are several different types of disinfectants that are currently used in the greenhouse for plant pathogen and algae control. They are quaternary ammonium compounds, hydrogen dioxide, chlorine dioxide and chlorine bleach.

Alcohol, although not used as a general disinfectant, is mentioned here because it is used by growers to disinfect propagation tools. All these products have different properties. If possible, disinfectants should be used on a routine basis both as part of a pre-crop clean-up program and during the cropping cycle.

Quaternary ammonium chloride salts
Q-salt products, commonly used by growers, are quite stable and work well when used according to label instructions. Q-salts are labeled for fungal, bacterial and viral plant pathogens, and algae. They can be applied to floors, walls, benches, tools, pots and flats as disinfectants. It is also labeled for use on seeds, cut flowers and plants. Carefully read and follow label instructions. Recommendations may vary according to the intended use of the product.

For example, objects to be sanitized should be soaked for 10 minutes, and walkways for an hour or more. Instructions recommend that surfaces be air-dried after treatment except for cutting tools. It is recommended to soak cutting tools for 10 minutes before use, then using the wet tool on plants. One way to do this is by having two cutting tools, one pair to use while the other is soaking.

Q-salts are not protectants. They may eradicate certain pathogens but will have little residual activity. Contact with any type of organic matter will inactivate them. Therefore, pre-clean objects dislodge organic matter prior to application. Because it is difficult to tell when they become inactive, prepare fresh solutions frequently (twice a day if in constant use). The products tend to foam a bit when they are active. When foaming stops, it is a sign they are no longer effective. No water is needed.

Hydrogen Dioxide
Hydrogen dioxide kills bacteria, fungus, algae and their spores immediately on contact. It is labeled as a disinfectant for use on greenhouse surfaces, equipment, benches, pots, trays and tools, and for use on plants. General recommendations state that all surfaces should be wetted thoroughly before treatment. Several precautions are noted. Hydrogen dioxide has strong oxidizing action and should not be mixed with any other pesticides or fertilizers.

When applied directly to plants, phytotoxicity may occur for some crops, especially if applied above labeled rates or if plants are under stress. Hydrogen dioxide can be applied through an irrigation system. As a concentrate it is corrosive and causes eye and skin damage or irritation. Carefully read and follow your product's label precautions.

Sodium Carbonate Peroxyhydrate
Algaecides are granular and activated with water. Upon activation, sodium carbonate peroxhydrate breaks down into sodium carbonate and hydrogen peroxide. Non-target plants suffer contact burn if undiluted granules are accidentally spilled on them.

Chlorine Dioxide
Chlorine dioxide is a disinfectant in the horticulture industry for controlling algae, bacteria, viruses, fungi and other microbial pests on greenhouse surfaces and in greenhouse irrigation systems. It is labeled to be used to clean out irrigation lines with a periodic treatment

▶ 6

◀ Cleaning and Disinfecting from page 5

at a moderate dose or to keep lines from becoming re-contaminated by treating irrigation water flowing through the system with a continuous ultra-low dose. Research continues to be conducted on this product to expand its use in the industry.

Alcohol (70 percent) is a very effective sanitizer that acts almost immediately upon contact. It is not practical as a soaking material because of its flammability. However, it can be used as a dip or swipe treatment on knives or cutting tools. No rinsing with water is needed.

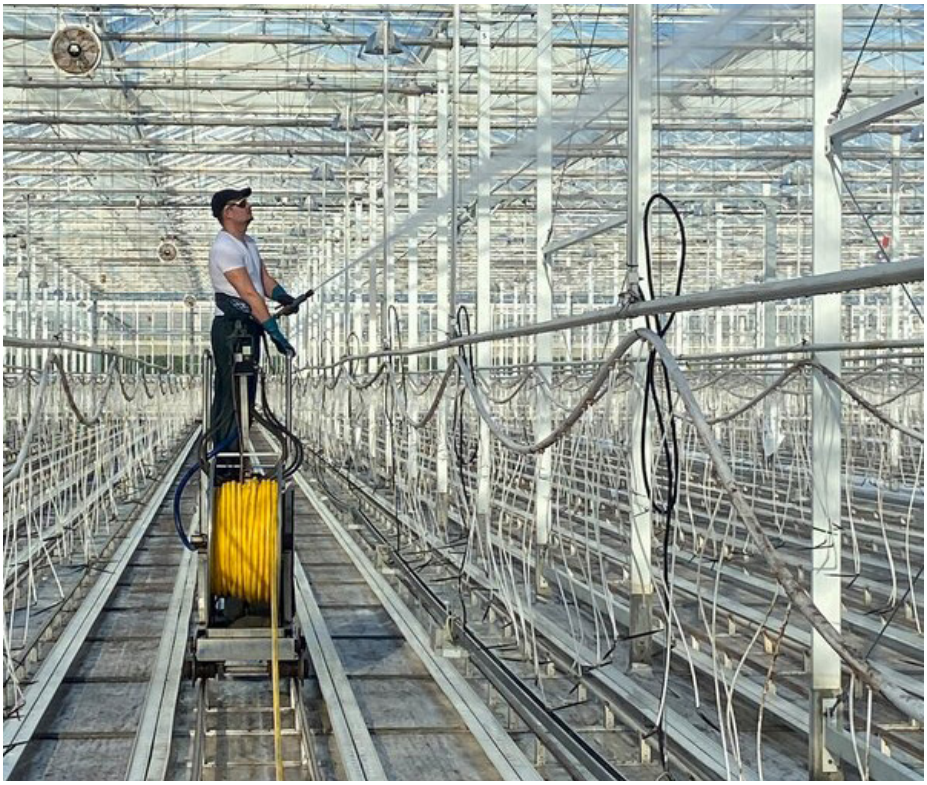
Disinfectants should be used on a routine basis both as part of a pre-crop clean up program and during the cropping cycle.

This information is supplied with the understanding that no discrimination is intended and no endorsement implied.

Due to constantly changing regulations, we assume no liability for suggestions. If any information in this article is inconsistent with the label of the product you are using, follow the label.

Steps to Prevent Disease Contamination

- Disinfect benches, preferably made of wire. Pots, flats and trays should be new or disinfected. Wood benches can be a source for root rot diseases and insect infestations. Algae growing on wood surfaces create an ideal environment for fungus gnats and shore flies. Plant pathogens such as Pythium can grow within the wood and plants rooting into the wood can become infected.
- Disinfect potting tables preferably made of a non-porous surface such as a laminate.
- Set up washing stations for hand washing and foot baths at the entrances of each greenhouse, especially propagation houses.
- Keeping hands and fingernails clean can help reduce the spread of diseases. If wearing latex or other protective gloves, clean as you would your hands and change periodically. Change the disinfectant daily in foot baths and wash floor mats weekly.
- Keep pets off of benches and potting areas.
- Provide supports throughout the greenhouse to hang hose nozzles. Keep all containers and hose nozzles off the floor to prevent contamination with pathogens.
- Keep growing media in a clean area and covered.
- Avoid carrying over plant material.
- Avoid accumulating dirty pots, old growing media or plant debris in the media mixing area.
- Make sure trash bins in the greenhouses are covered so that disease spores do not spread to the crop.
- Use horticultural oil on vegetation/ weeds outside, around the greenhouse perimeter to smother over-wintering pests.



Source: Dept. Plant, Soils and Insect Sciences, University of Massachusetts.

DO YOU HAVE A SERVICE LEVEL AGREEMENT with your export agent?

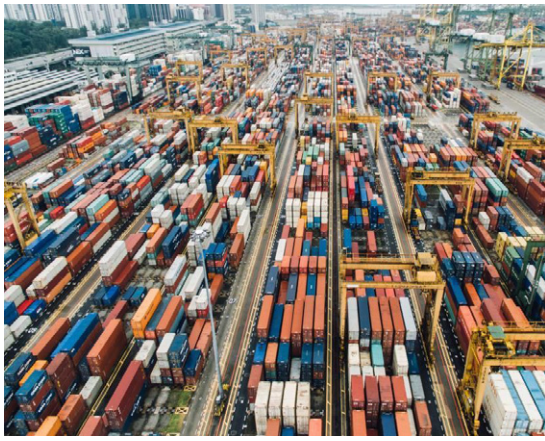
There is seldom a service level agreement between a grower and his agent, be it an export agent or fresh produce agent. When prices are favourable nobody seems to care about a service level agreement (SLA), but when prices are below expectations, problems arise.

If you do not have a service level agreement, important aspects might not be discussed, such as:

•What steps the export agent should take if the fresh produce is not approved for export by the PPECB;

- Whether the export agent must disclose to the grower particulars of the countries where it is envisaged that marketing will take place;
- What will be the incentive, remuneration, commission, fee, rebate or brokerage which will become payable to the export agent;
- How often will account sales reports be provided to the grower and what information will the account sales report reflect to ensure there is full transparency of the transaction;
- Must the export agent have insurance for losses or damages suffered due to dishonest conduct by the export agent or his staff, insofar as such conduct relates to sales monies received for the fresh produce;
- Will the grower's fresh produce form part of a pooling arrangement and if so, who the other growers will be and how will losses be shared by the pool participants;
- If penalties and/or dead freight costs are incurred, who will be responsible for any such demurrage and/or dead freight costs;
- Will the sales money received be paid in a trust account in order to ensure it does not form part of the export agent's assets and liabilities;

The above highlights some of the aspects that should be discussed in advance and preferably be documented. To assist growers, APAC has a standard SLA template on their website which can be used to guide your discussions with your export agent.



Your export agent operating on the local market?

If your export agent occasionally operates on the local market, he or she must also be registered with APAC under the fresh produce agent category. Visit the APAC website (www.apacweb.org.za) to view the list of registered agencies and agents.

If you need more information, visit their website or contact the APAC office.

Source: APAC

Image of greenhouse fertigation mixing tanks. (Pic: Bosman Van Zaal)

GREENHOUSE MIXING TANKS: Dissolving macro- and micronutrients

Growers who use plastic-lined dams or 'porta-pools' as nutrient solution reservoirs, fill these huge reservoirs with water, adjust the total alkalinity (pH) and then add the correct mass of each kind of fertilizer to it. An applied fertilizer should be dissolved before the next fertilizer is added. Pumps are used to induce a stir action.

With this procedure, the chance of having high concentrations of ions such as calcium and sulphate in one area is minimised and precipitation is prevented. Growers with good quality feeding water (EC<0.3 mS cm-1) may prefer to buy pre-mixed fertilizers. Most 'ready mixes' are sold in two bags; one containing Ca (and possibly Fe-chelate and some potassium nitrate) and the rest of the nutrients are kept in a second bag. These bags should be dissolved separately.

A problem with open, dam reservoirs is that algae grow in nutrient-rich water when it is exposed to light. Even though the solution may appear to be clear, low concentrations of algae may still block filters and drippers. Thus, solutions in open reservoirs or 'portapools' should be darkened. Where the shading is not sufficient, algae will remain to be a problem (not to be lower than 3.5 since this chelate is destroyed at pH<3 (Deckers, 2004). An upper pH limit of 6.5 is also used for the Ca/Fe tank, to prevent damage to Fe-EDTA and to prevent transformation of ammonium into NH3 gas.

EC-regulated nutrient concentrate injectors have synchronised valves, opening or closing valves from stock solution tanks to increase or decrease the EC. Other mixers may be volumetrically controlled. Should a stock solution contain nutrients at concentrations of 100 times more than the recommended levels for a specific crop, then one litre of concentrate needs to be injected per 100 litres of water.

When you irrigate with nutrient solution (fertigate) and only have a small number of plants, the mixers may have difficulty to apply the pre-set EC value due to over- and under-dosing fluctuations. This can be prevented by using lower concentrates in the stock solution tanks, until more or bigger plants are fertigated, needing bigger flow rates.

When a micronutrient stock solution mix is prepared, make sure that the pH is always lower than 6.5. Some boron (B) sources may increase the solution pH when dissolved. Some growers with zero or very low micronutrient levels in their feeding water, may prefer to use pre-mixed micronutrient products. Should these 'micro-mixes' be used, it can be added to a stock solution tank, provided that the pH in the tank is between 3.5 and 6.5. If this is not possible, a third micronutrient stock solution tank should be added. Two or more stock solution tanks

Most growers with modern greenhouses use concentrated stock solutions in two or more tanks. They use special equipment to control the release from stock solution tanks into the feeding water so that the nutrient solution may

▶ 9

reach the greenhouse at the correct EC and optimum pH. Where the quality of the feeding water is good, having an acceptable alkalinity and an EC of less than 0.3 mS cm-1, a commercial 'ready mix' may be used. These pre-mixed products are usually sold in two bags. The content of one bag is dissolved into the first stock solution tank and the other into the second tank. By adding 100 times more than the prescribed dose, the stock solutions will be 100xconcentrated.

These concentrates are both fed into the feeding water at a rate of one litre per 100 litres of water. This is done by injecting the concentrates (A and B), at a distance of at least 1.5 m apart into the pipe with feeding water to allow mixing of A with the water before B is injected.

Using feeding water that contains high levels of essential nutrients in the feeding water, it can simply be supplemented, changing the feeding water into a nutrient solution, rather than simply adding a standard mix to the water. 'Ready mixes' should not be used where the EC of feeding water is higher than ±0.3 mS cm-1 or where it contains high micronutrient levels. By compiling a nutrient solution to fit specific water or growing conditions, better ion ratios will be possible with a lower fertilizer bill as bonus.

When stock solution tanks are used, the correct ion combinations should be considered. When mixing, the best-known problem salts are CaSO4 and Ca(H2PO4)2.H2O, forcing growers to separate Ca from sulphate and phosphate. Rather than placing all the K-nitrate into the sulphate-phosphate tank, 50% of the K-nitrate may be transferred to the Ca-nitrate tank to speed up the dissolving process in the phosphate/sulphate tank.

By using MKP rather than MAP as P source in the phosphate/sulphate tank, the tank will contain zero ammonium. By using ammonium nitrate with Ca-nitrate in the other tank, you have both N-sources in the Calcium tank and can easily change the ratio between nitrate and ammonium in this tank (without affecting the other tank), in order to manage the alkalinity and pH of the root zone solution, as discussed earlier (15.4).

Where relatively low levels of acids (<0.8 meq L-1) are needed to lower the alkalinity of a feeding water, this can be done by adding the correct amount of acid to the phosphate/sulphate stock solution tank, provided that the chelated Fe is added to the Ca-nitrate tank. This phosphate/sulphate tank, containing the rest of the micronutrients, may be exposed to acidic conditions but an upper limit of pH 6.5 should not be exceeded. The pH in the Ca-nitrate tank, containing chelated Fe (Fe-EDTA), should not be exceeded.

The pH in the Ca-nitrate tank, containing chelated Fe (Fe-EDTA), should not be lower than 3.5 since this chelate is destroyed at pH<3 (Deckers, 2004). An upper pH limit of 6.5 is also used for the Ca/Fe tank, to prevent damage to Fe-EDTA and to prevent transformation of ammonium into NH3 gas. EC-regulated nutrient concentrate injectors have synchronised valves, opening or closing valves from stock solution tanks to increase or decrease the EC.

Other mixers may be volumetrically controlled. Should a stock solution contain nutrients at concentrations of 100 times more than the recommended levels for a specific crop, then one litre of concentrate needs to be injected per 100 litres of passing water. When you irrigate with nutrient solution (fertigate) and only have a small number of plants, the mixers may have difficulty to apply the pre-set EC value due to over- and under-dosing fluctuations.

This can be prevented by using lower concentrates in the stock solution tanks, until more or bigger plants are fertigated, needing bigger flow rates.

When a micronutrient stock solution mix is prepared, make sure that the pH is always lower than 6.5. Some boron (B) sources may increase the solution pH when dissolved. Some growers with zero or very low micronutrient levels in their feeding water may prefer to use pre-mixed micronutrient products. Should these 'micro-mixes' be used, it can be added to a stock solution tank, provided that the pH in the tank is between 3.5 and 6.5. If this is not possible, a third micronutrient stock solution tank should be added.

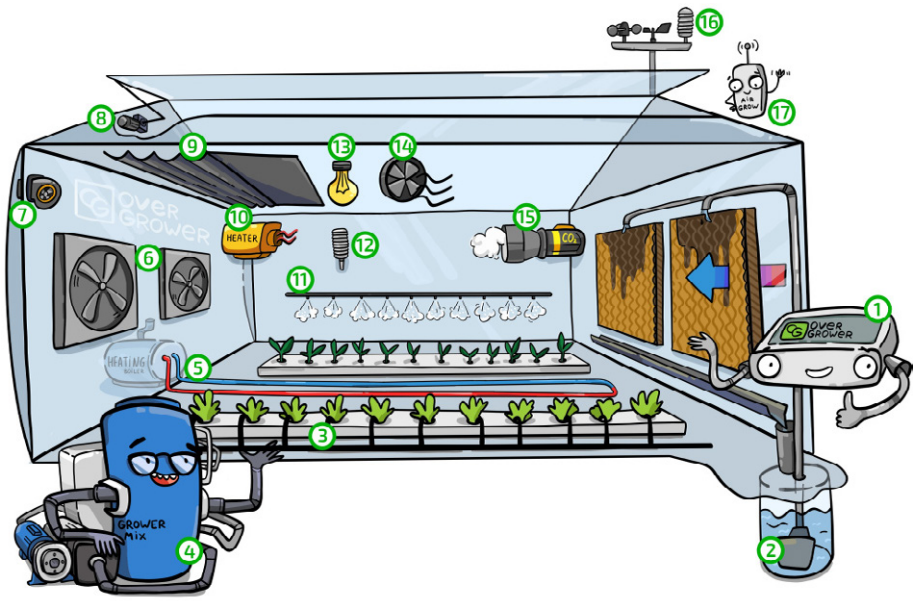
Mixing stock solutions

Salts dissolve quicker at low concentrations. Therefore, the volume of water used when preparing stock solutions should be as big as possible. The stock solution tank should be filled with water to at least 70% before the fertilizers are added.

A chemical pump may be useful to dissolve chemicals. It is important to monitor the pH during the dissolving of salts, especially in the phosphate/sulphate tank.

As with micronutrients, the pH of a phosphate- or ammonium containing concentrate should not be allowed to rise above a level of 6.5. It may help to add the chemicals with acid residues (such as MKP) first.

By having a suction nipple in the middle of a stock solution tank (halfway between the base and the top) and an injection nipple at the bottom, the chemical pump can be used to lift and mix the added fertilizers from the bottom of the tank.



By: Prof Nic JJ Combrinck from his book; Nutrient Solutions Management. By: Prof. Nick Combrinck

GREENHOUSE FARMING THE FUTURE OF AGRICULTURE?

The world is changing, and so are our demands. It is time to make sure that we can integrate the best tactics and achieve an amazing, improved outcome. In recent years, the concept of greenhouse farming has become extremely popular.

As climate changes continue to threaten production, it has become the need of the hour to shift to sustainable measures. Top greenhouse manufacturers have come forth to improve the outcomes and find measures that are sustainable in the long run.

Top Reasons Why Greenhouse Farming Is the Future

Some of the greenhouse manufacturers have become extremely popular, and they have started a complete venture into this domain. The top reasons why it is the future of greenhouse farming are:

Climate Resilience

A common reason why greenhouse farming has become so popular over the past years is that it is not dependent on climate change. Unpredictable rainfall or even temperature changes are a common reason why your crops might not turn out the way you want them to.

With greenhouse farming, that is not the case. Greenhouse farming happens in a controlled microenvironment, and it ensures a consistent food supply to the plants. This resilience allows crops to grow throughout the year with maximum supply.

Higher Yields

Most greenhouse suppliers in South Africa, as well as adjoining areas, have noticed how greenhouse farming can lead to higher yields. It is much more space-efficient when compared to open field farming. As the conditions are optimised, plants are far better able to grow and then mature at a well-rounded speed.

There are also options like vertical farming and hydroponics that are used in a good greenhouse. This can further enhance productivity and ensure that you are able to make the best use of space. This will automatically lead to higher yields and a sustainable turnover.

Efficient Use of Water

When you want to make a sustainable choice, it is extremely important to make sure that you understand how to use water. Greenhouse farming can significantly reduce the need for advanced irrigation systems. The most common systems often used in this respect are the drip irrigation system and hydroponics. The best thing about this system is that it delivers the water right into the roots of the plant.

As the plants are able to get the water right on time and in the desired quantity, it helps in the maximum use of the water. Often, greenhouse farming can reduce the need for chemical fertilizers and pesticides. The controlled environment protects crops from pests and disease. It also makes it much easier to grow food organically and with fewer inputs.

Best for High Value Crops

If you are highly interested in the domain of high-value crops, then you have to consider greenhouse farming for several reasons. For example, strawberries, herbs, tomatoes, and even bell peppers grow extremely well when you consider greenhouse farming for the same.

Take help from top greenhouse manufacturers in Africa to ensure optimum yield. For any kind of high-value crop, it is extremely important to make sure that you have specific environmental conditions. This will foster the growth of the plant and ensure maximum production. Greenhouse farming helps you achieve that very easily, and you get the best value crops.

Sustainability and Environmental Impact

And finally, another reason why you should certainly consider greenhouse farming is that it is sustainable and good for the environment. Unlike traditional methods, this mode of farming allows you to grow sustainable food production. It minimizes the chances of waste production and often uses a very small quantity of chemicals.

Often, people integrate greenhouse farming with rainwater and solar panels. This helps you to use the right quantity of water and also reduce the carbon footprint as much as possible.

Greenhouse farming is the future of agriculture, and it often has a great impact. If you want to make sure that you get good returns, then investing in the right greenhouse manufacturers in South Africa is imperative. **Source: Sheel biotech**

HARVESTING, PACKING AND STORING GREENHOUSE PRODUCE CORRECTLY

To prepare greenhouse-grown produce for a fresh fruit market with a lower environmental impact, you should first calculate your current carbon footprint by measuring emissions from fertilizer use, machinery, and water consumption.

Importantly, implement mitigation strategies such as using sustainable farming practices like organic methods and crop rotation, optimizing the use of synthetic fertilizers and pesticides, reducing energy use by investing in renewable energy and efficient equipment, and minimizing waste through better packaging and transport.

MEASUREMENT AND ASSESSMENT

Measure carbon footprint: Use tools like the GHG Protocol to calculate your total greenhouse gas (GHG) emissions.

Identify key sources: Pinpoint your highest emission sources, which will likely be synthetic fertilizers, agricultural machinery, and transportation.

Assess water use: Evaluate your irrigation practices, as intensive irrigation can lead to water scarcity and is a significant environmental concern.

SUSTAINABLE FARMING PRACTICES

Fertilizer management: Reduce the use of synthetic fertilizers, especially nitrogen, and focus on improving soil fertility through practices like crop rotation and composting.

Pesticide reduction: Choose organic farming methods that avoid or significantly limit the use of synthetic pesticides. If you must use them, apply them carefully to prevent contamination of air, soil, and water.

Soil health: Implement practices like crop rotation, limiting tillage, and improving soil quality through other means to store more carbon in the soil.

OPERATIONAL EFFICIENCY

Energy efficiency: Invest in renewable energy sources and energy-efficient machinery for your operations.

Machinery use: Schedule machinery use to be more efficient and maintain your equipment regularly to improve performance.

Transportation and logistics: Optimize transportation by consolidating shipments, using fuel-efficient vehicles, and planning efficient routes.

Packaging: Choose packaging materials with a low carbon footprint and explore innovative and sustainable packaging methods.

Innovation rooted in reliability.

Boost your tomato yields with proven solutions.

by Editorial Team, ProAgri

In the high-stakes environment of undercover farming, maximising your yield and fruit quality isn't about more effort – it's about applying precise, scientifically-backed technology.

Dux Agri offers tested, high-performance solutions that work at a cellular level to protect your investment and ensure you harvest more A-Grade fruit. Stop managing losses and start focusing on guaranteed performance with Dux Agri's proven product line.

Our core products act as powerful performance enhancers, addressing critical stages and stress factors in the tomato life cycle, delivering superior, measurable results.

Kiplant Eckosil
This bio-available Ortho-silicic Acid (Silica) enhances structural strength and stimulates photosynthesis. This fortification delivers enhanced abiotic stress tolerance against drought, extreme temperatures, salinity and sunburn, while the mechanical barrier reduces vulnerability to pests and pathogens. Crucially, its low-pH formulation ensures excellent compatibility in tank mixes, simplifying your spray programme.

Enermax
As an energetic biostimulant, Enermax is formulated to maximise energy flow and promote vigorous cell division in the fruit. It strategically influences the translocation of photo-assimilates, directing nutrients and energy away from vegetative growth directly into the developing fruit. This action results in significant fruit sizing and uniformity, directly increasing your marketable yield.

Cuperdem
Cuperdem is a novel, easily assimilated copper-gluconate formulation (6% w/w) that provides both contact and systemic action against a range of fungal and bacterial diseases. The systemic action and rapid cellular assimilation provide superior internal protection and remain effective at lower application rates, eliminating phytotoxicity risks. Beyond protection, this copper complex boosts the plant's natural immune system by enhancing enzymatic processes and photosynthesis, providing a physiological boost.

Why Dux Agri products deliver results
The combination of Kiplant Eckosil, Enermax, and Cuperdem provides the tomato grower with a synergistic crop health programme:

- **Kiplant Eckosil** builds the physical resilience of the plant, protecting against the initial stresses that often reduce yield potential.
- **Enermax** strategically directs the plant's energy for maximal return, ensuring the plant's robust growth translates directly into larger, more uniform, high-quality fruit.
- **Cuperdem** maintains crop health with its low-phytotoxicity, systemic copper solution, minimising disease-related losses and supporting key metabolic functions such as photosynthesis.

By giving producers access to these scientifically formulated and field-tested solutions, Dux Agri ensures that every step in tomato production supports optimal plant health, exceptional resilience, and superior yield potential. Please feel free to contact us if you need any technical or sales support at 012 548 1214 or info@duxagri.com

DUX AGRI

CONFLICTING PEST CONTROL COULD INCREASE PEST POPULATIONS

Two-spotted spider mite and eggs.

Producers applying the wrong combination, environmentally and health-friendly pest control strategies might increase crop pest populations. According to a study at the University of Amsterdam researcher Merijn Kant, this counter-intuitive was idea was tested.

Pests on agricultural crops can be a serious nuisance for farmers who do their best to keep the unwanted bugs in check. To limit impacts on the environment and human health, crop protection in the European Union relies increasingly on the use of biological control, pest-resistant plants, and 'green' pesticides containing natural compounds instead of synthetic compounds.

As each of these methods is insufficient effective on their own, there is a tendency to combine the strategies. This concept of integrated environmentally friendly pest control sets the agenda for agriculture.

Wrong combinations

However, using the wrong combination of strategies may lead to an increase in crop pest populations. 'Predator-prey models predict that resistance breeding and pesticides – with synthetic or natural – may hamper biological control to an extent that the level of overall crop protection will often decrease rather than increase', said Dr. Kant.

Giving plants a helping hand by tweaking their genes through targeted breeding to create resistant plants might hinder the actions of biological control agents just as they hinder unwanted pests. One instance in which this can happen is when the plant is resistant because it is less palatable for insects. This will affect not only the harmful insects but also the beneficial ones since their prey will be of poorer quality.

Mathematical models predict that under these conditions harmful insects may escape predation better than if they feed on plants void of resistance. They can thus reach higher densities and inflict more damage to the crop. In this case, plants without defences may be defended better with biological control.

Urgent risk

The EU banned various popular pesticides, creating an open niche for breeders to invest in new resistances for their crops. The time is now for further research on conflicting environmentally friendly pest control strategies.

"'The counter-intuitive concept should be tested because the results can profoundly alter the rationale behind the design of integrated pest management strategies," said Dr. Merijn Kant. "If we ignore this, we expect an enormous decrease in efficiency of environmentally friendly pest control, one that resistance breeding and 'green' pesticides cannot compensate for."

Defenceless defences

As the coordinator of the project Kant cooperates with scientists from three different research institutions in the Netherlands, Belgium and Spain. Together they assessed to which extent prey densities in a predator-prey system, i.e. a bio-control agent and its target pest, are influenced by chemical plant resistance traits and natural pesticides during a three-year project, entitled Defdef (short for 'Defenseless defenses').

Source: University of Amsterdam

There are four species of aphids commonly found in strawberries: the green peach aphid, Myzus persicae, the melon aphid, Aphis gossypii Glover, the potato aphid, Macrosiphum euphorbiae, and the strawberry aphid, Chaetosiphon fragaefolii.

Chili thrips, Scirtothrips dorsalis Hood, is a more recently introduced pest that was first reported in the US.

Powdery mildew

GREENHOUSE PRODUCERS: BEWARE OF IMMINENT THREATS

South African greenhouse produce currently faces a variety of persistent and emerging disease threats, amplified by climate change. A biosecurity summit in mid-2025 highlighted several recent disease confirmations affecting the broader agricultural sector, signalling heightened risks.

In enclosed greenhouse environments, these threats are magnified by ideal conditions for pathogens. Persistent and emerging threats Viral diseases Viral threats are especially concerning for greenhouse produce, as they are often spread by pests that thrive in controlled environments.

Tomato spotted wilt virus (TSWV): This virus is widespread in South Africa and poses a serious threat to tomatoes, causing stunting, leaf rings, and discoloured fruit. It is transmitted by thrips, and certain South African isolates have shown the ability to overcome genetic resistance in some tomato cultivars. Pepper ringspot virus: A specific ringspot virus affecting peppers has been identified as a systemic risk to the country's supply chains.

Fungal diseases High humidity in greenhouses creates an ideal breeding ground for many fungal pathogens. Fusarium species: This fungal disease is a frequent and destructive threat to greenhouse tomatoes, causing wilting and root rot.

A 2023 study linked outbreaks to weather conditions that stressed plants and made them more susceptible to root-rotting fungi. In early 2025, the Department of Agriculture issued an alert confirming the detection of this fungus in commercial papaya orchards in the Limpopo and Mpumalanga provinces.

While affecting papaya, this pathogen can have a wide host range. Powdery mildew and downy mildew: These moisture-loving molds are a perennial problem for cucumbers and other greenhouse crops, thriving in humid conditions and poor air circulation.

Challenges and risk factors

Several compounding factors are increasing the vulnerability of South African greenhouse produce. Climate change: As a climate change "hotspot," southern Africa is experiencing temperature increases at a rate double the global average. This is leading to less predictable rainfall, more frequent droughts, and higher temperatures, all of which stress crops and increase susceptibility to pests and diseases.

Water quality and availability: Declining freshwater quality and quantity threaten agriculture, including greenhouses. Warmer, drier conditions increase the risk of water-borne pathogens and intensify droughts.

Pest and vector management

Thrips and whiteflies, common greenhouse pests, are known vectors for devastating viruses like TSWV and Tomato yellow leaf curl virus. Effective pest control is a constant challenge for preventing virus outbreaks.

Chemical restrictions

Global safety standards are leading to the discontinuation of certain agricultural remedies, which could limit control options in the future. The industry is moving toward non-chemical alternatives, but these strategies require careful management.

Biosecurity protocols

Poor sanitation and biosecurity measures can contribute to the spread of persistent pathogens like Fusarium. The recent National Biosecurity summit emphasized the need for better preventative action.

Common South African greenhouse produce like tomatoes, cucumbers, and peppers are currently under threat from various diseases, including several common fungal, bacterial, and viral infections.

Tomato spotted wilt virus

Downy mildew

A major contributing factor is the enclosed environment of greenhouses, which can create high-humidity conditions ideal for pathogens. Common threats across greenhouse crops **Root diseases (Pythium and Fusarium):** These soil-borne pathogens can persist in growing media and cause serious root rots and wilting.

Poor sanitation practices in greenhouses contribute to their spread. Grey mould (Botrytiscinerea) is a common fungus thrives in cool, humid conditions and can cause severe symptoms on the leaves, stems, and fruit of numerous crops, including tomatoes and peppers.

Viral diseases
Pests common in greenhouses, such as aphids, thrips, and whiteflies, act as vectors for devastating viruses.

Tobacco mosaic virus (TMV): A serious threat to tomatoes, this virus can be carried into greenhouses by workers who use tobacco products and can wipe out an entire crop.

Pest infestations
Although not a disease, common pests like whiteflies and red spider mites directly damage plants and act as vectors for harmful diseases. Threats specific to greenhouse produce Tomatoes Bacterial canker (Clavibactermichiganensis) spread through infected seeds and seedlings, this disease causes progressive wilting and browning of internal stem tissues.

Late blight
This highly destructive disease spreads rapidly under cool, wet, and high-humidity conditions, causing extensive lesions on leaves and stems and rapid crop loss.

Tomato spotted wilt virus (TSWV): Thrips vector this virus, which causes yellow or brown ringspots on the fruit. It can be especially problematic when tomatoes are grown near ornamental plants, which may harbour the thrips.

Tomato yellow leaf curl virus (TYLCV): This virus is transmitted by whiteflies and can lead to significant crop damage and yield loss. Cucumbers Downy mildew (Pseudoperonosporacubensis) water-mold thrives in high-humidity environments. It causes yellow or brown spots on the upper leaf surface and grey or purple fungal growth on the underside.

Bacterial wilt is carried by cucumber beetles; this bacterium causes wilting and collapse of the entire plant. **Beet pseudo-yellows virus (BPYV):** Vectored by whiteflies, BPYV causes yellowing on older leaves and can be confused with physiological disorders.

(Xanthomonascampestris): This can cause spotting on leaves, stems, and fruit. It is spread by contaminated water and poor sanitation. Pepper mild mottle virus (PMMoV): This virus can result in stunted growth, leaf mottling, and misshapen fruit, causing significant yield loss.

Blossom end rot: While a physiological disorder rather than a disease, it is a persistent problem for peppers grown in greenhouses. It is caused by calcium deficiency often linked to inconsistent watering or high nitrogen levels.

Early and daily inspection in greenhouses assure least, if any crop losses.

LIGHTING ON GREENHOUSE CROPS IMPROVES PRODUCTION

Strawberries and other soft fruits are a favourite of consumers and chefs year-round, and they really shine when grown with LED greenhouse grow lights. When you use GreenPower LED toplighting and flowering lamps, it is possible to have three cultivation cycles per year, better control of harvest times, and save energy costs. With a custom light recipe, you can also improve strawberry elongation for earlier harvests.

Controlled environment agriculture growers have been trying to fit a square peg into a round hole by growing field crops in indoor environments. This is changing as research tries to match plant genetics with the production environment.

During an International Congress on Controlled Environment Agriculture (ICCEA) at the University of Florida, the overlooked reality surfaced that not enough food crop varieties are bred for indoor controlled environment production.

One of the limitations of controlled environment agriculture (CEA) is that the conditions do not match the genetics. Most plants being grown in CEA environments were developed for field production.

There are a lot of opportunities that go unrealized by growing plants in a controlled environment. It's like asking Chihuahuas to pull a dog sled. Plants that are bred for one application are expected to perform under very different applications. The genetics don't match.

On-going research develops a greater number of food plants with the potential to develop different products using the same set of genetics by changing the environment, for instance, with lighting.

Creating new generations of greenhouse plants

Folta, of University of Florida said research is ongoing to develop the next generation of plants with the potential to develop different products using the same set of genetics by changing the environment.

"By flipping a switch and varying the light spectrum we could change green leaves to purple or have the plants accumulate specific flavours or textures or nutra-ceutical compounds," he said. "That is all very realistic. This is like being able to shine a different light spectrum on a Chihuahua and turning it into an Alaskan malamute or a dachshund. A plant's body, its composition, its chemicals, its secondary metabolites could be altered by changing the light environment. We research on plants that are ready to do that. We need to expand research to enhance those genetics.

"We are exposing plants to different light spectra and evaluating how the plants behave and perform. Then we work with plant breeders to develop the next varieties."

Varying the light spectrum has the potential to change leaf colours and textures and to have plants accumulate specific flavours or nutra-ceutical compounds.

Need for more industry involvement

Folta said the companies that are developing and manufacturing the lights for CEA production should become more involved with the development of plants grown in these environments.

"The lighting companies should work closer with university researchers and plant breeders," he said. "The lighting companies should be able to advise growers about grow lights the seeds that grow best under them. That opens up recurring revenue for the lighting companies. It behoves the lighting companies to focus on identifying plants that perform best with their products.

Folta said plants are the most complicated part of matching the genetics with the environment and the part that people worry least about.

"It doesn't matter whether the breeding company or the lighting company takes the initiative to develop the genetics," he said. "This is going to happen whether it's private plant breeders, universities or technology companies. This is another niche to create new genetics. We already notice role players filling this void."

Researchers are learning that green, far red and UV light have important roles to play in controlled environment agriculture plant production.

Limiting, changing the production environment

Even recognised technology companies are finding opportunities in controlled environment agriculture.

▶ 17

"These types of companies will develop the genetics or will find the genetics that work well in CEA environments," Folta said. "For now the field genetics will continue to be put in artificial conditions, and the indoor environment will be reshaped to accommodate the plants.

"What should be done is finding or developing plants for these energy-efficient, artificial conditions that are sufficient to support growth. On-goingrResearch needs to be done to determine how to maximize output or yields with fewer photons of light or colours of light. Research is going to focus on economic viability.

"My interests are much more about food and how we create the next generation of profitable growers and higher nutrient crops that are more readily available for consumers. That's what gets me fired up."

While matching the genetics to fit the environment is important, Folta said researchers also need to be looking at limiting the environment.

"At the same time that we are looking at the breeding and genetics, we are also looking at how we can deliver shorter pulses of light that still maintain the same output," he said. "We have cut energy application by 50-80 percent and grown comparable products. The viability of these systems has come from people who have focused on the diminishing return of light efficiency. What they need to work on is the plant efficiency. That is something that is extremely viable."

Folta said all of the research he has been focused on is with small format, high value crops, including lettuces, sprouts and microgreens.

"Our university does not have all the facilities to conduct the necessary experiments," he said. "But we are partnering with others to do that. We will have good access to larger spaces in future. It's less likely that this type of production would be done with crops that take more space like melons. We are looking at plants where the vegetative portions of the plants are eaten. If you consider a head of lettuce, every photon that is invested results in the plant structure.

With a crop like tomatoes, 80-90 percent of the biomass is being thrown away or composted.

Kevin Folta at the University of Florida is interested in how to create the next generation of profitable growers and higher nutrient crops that are more readily available to consumers.

"Growing the plants in shorter production times, shorter supply chains, better postharvest quality because of shorter supply chains, possibly lower costs, a lower carbon footprint and access to local markets, these are the issues I want to address.

"We notice this being done with lettuces, microgreens and herbs such as cilantro and basil. Folta said 15 years ago people thought the idea of light recipes and changing the spectrum was a crazy and senseless idea.

"Researchers and light manufacturers thought mixtures of red and blue light were all that was needed to grow plants in controlled environments, so there wasn't any concern about doing anything different," he said.

"Now people understand that green, far red and UV light have important roles and that light quality should change throughout the day. With that in mind, it gives us some flexibility when it comes to changing the production environment, which is a good thing," Folta concluded.

While general images of greenhouse lighting are widely available, finding specific pictures of lighting in South African greenhouses requires a broader search term like "commercial greenhouse lighting South Africa" or "agricultural lighting South Africa" to narrow down results. You can then look for images of common systems like high-tech vertical farms using LEDs, large commercial operations with High-Pressure Sodium (HPS) or Metal Halide (MH) lights, or even smaller setups that blend natural sunlight with artificial light.

Types of greenhouse lighting systems
LED lighting: This is becoming the standard, with many modern greenhouses using full-spectrum or red/blue LEDs to provide specific light recipes for different crops.

High-Pressure Sodium (HPS) and Metal Halide (MH): These are powerful lights, with HPS lights often used during the flowering stage due to their warmer, more red/orange light.

Hybrid systems: Some growers combine natural sunlight with artificial lighting to supplement the light available, especially during low-light seasons.

How to find more specific images
Use more specific search terms: Instead of just "greenhouse lighting," try adding "South Africa" to the search to see if local projects are featured.

Search agricultural or horticultural company websites: Look for images from South African companies that specialize in greenhouse technology or lighting.

By: David Kuack

TURNING 1 STRAWBERRY PLANT INTO MILLIONS

A look inside the propagation system that propels successful strawberry businesses.

In South Africa, many commercial strawberry growers still buy their seedlings from external nurseries.

For some, that means spending around R5 per plant at the start of the season. Some strawberry farmers can spend R25 million on 5 million plants just to get started!

If you're one of these growers and you're looking to reduce your starter costs, what if the solution were your own nursery?

With a nursery, you could lock in your supply, cut long-term costs, and take full control of timing and quality of your plants. Yes, strawberries are complex to propagate.

The entire process can take years to bear fruit (literally). But with the right system, it's very doable.

Vegtech Netafim has helped leading growers build on-site nurseries that turn 1 strawberry plant into millions.

Not only do we have the engineering know-how, but also the agronomical expertise to help you adapt your farm, build the right structures, and meet the demands of every phase of the strawberry lifecycle.

It's a proven model that, for most farmers, pays for itself within four to five years.

Why Buying Plants Keeps Getting Riskier

Outsourcing seedlings might seem simpler. But it leaves you open to a set of problems that get worse as demand rises.

1. You're Bleeding Margin
R5 per plant adds up fast. And with annual price hikes, your margins shrink before planting even begins.

2. Unpredictable Supply Chains
Seedlings can arrive late. Or too early. Or with uneven quality. Local suppliers don't always deliver on time either.

3. You're Not in Control
When you depend on outside nurseries, your season hinges on someone else making the rules and getting it right.

Whether it's cost, timing, the calibre of plants or losing your supply to a war of increasing demand, your business is in many ways in someone else's hands.

And with local demand for strawberries on the rise, that risk is only growing. You might be doing everything right, but you're still exposed.

Why Growers are Building their Own Nurseries
Yes, it's a cost decision. But it's also a control decision.

When you own your propagation, you control:
Plant quality
Delivery timing
Your margins
Your risk

No more relying on delayed shipments or inconsistent quality. No more paying whatever the market dictates. You get your seedlings, your way, on your schedule.

The Propagation Process from 1 Plant to Millions

Strawberry propagation takes time, planning, and a steady hand. It's not something you guess your way through. We've mapped out the journey from a tissue culture to millions of seedlings. We've kept the language simple, but don't mistake that for simple work.

Each step has to be done in the right way, at the right time.

Step 1. Tissue Cultures
You'll be cloning your strawberry off one plant, so genetics are super important. It starts in a bio-secure lab. We take tissue cultures from a licensed variety and grow them in clean, climate-controlled conditions.

This becomes the foundation of your strawberry's genetic vault. If it's clean, virus and mutation-free, the whole pipeline should be too.

Step 2. Pre-Nucleus Phase
Clones are moved into sterile perlite containers inside a greenhouse nursery. Over two seasons, we track their performance. We watch for vigour, shape, and how they handle local conditions in field trials. Only the few strongest go forward.

Step 3. Nucleus Phase
These top plants are cloned again. Each one produces around 500 to 600 daughters per year for the foundational nursery.

▶ 19

This phase runs for four years before plants are replenished. It's the heartbeat of the whole system. You need consistency here, or everything downstream suffers.

Step 4. Foundation Nursery
From the nucleus daughters, we select the best foundation plants and move them into a separate nursery block. Each multiplies +- 160 times, making thousands of clean, strong mother plants.

All of this still happens under protected cover to keep the plants disease free.

Step 5. Cooling and Rooting Prep
We remove the leaves from the mother plants, so only the roots remain. The roots are chilled between July and September - a short break to sync them for the correct time of year to grow. And freezing the best genetics so they are good to go for the following year.

Step 6. Mother Nursery
After chilling, the plants move to hanging gutters. Here, they focus on runner production, not fruit. Warm days and long daylight hours kick things into gear. Each mother plant produces about 125 daughters from the runners. This is where the big numbers happen. But it's also where things can go wrong fast. That's why we're hands-on during this stage. Light, airflow, irrigation — it all matters.

Step 7. Rooting Nursery
The new daughter plants are clipped off and planted into seedling trays under the hanging mother plants. They root under the gutters for about a month. The timing is tight. You want strong seedlings ready for March field planting.

Step 8. Field Planting
The daughter plants are planted outdoors in late summer. They grow fast, flower early, and start fruiting as autumn rolls in. That timing gives you a strong winter crop when prices are usually high.

Why it Works
This process works because each stage builds on the last. Done right, it gives you high-quality seedlings, at the right time, in the right volumes. Skip a step or rush it, and you'll see it in your harvest.

That's why we don't just hand over a blueprint. Our agronomists work with your team, train your staff, and help you get the timing right.

TALK TO US AND WE'LL SHOW YOU THE NUMBERS

Now that we've scratched the surface of the complexities of strawberry farming, we'd love to talk to you about putting this into practice on your farm.

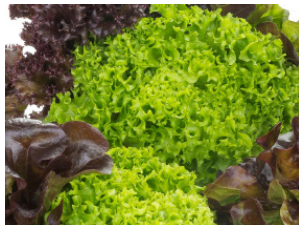
We'll help you understand what's realistic, what's possible, and what kind of return you could expect based on your farm and goals. And then we'll help you turn your vision into reality.

Source: Vegtech: info@vegtech.co.za.







GAUTENG

SAVE THE DATE

UNDERCOVER FARMING CONFERENCE

25 - 26 March 2026

CSIR International Convention Centre, Pretoria

UNDERCOVER FARMING EXPO

MORE INFORMATION CONTACT:
SUZANNE OOSTHUIZEN
Cell: 082 8321 604 or email:
expo@undercoverfarmingexpo.com

For more detail visit
www.undercoverfarmingexpo.com