

ucf Undercover farming

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Hou jou vinger op
die pols van landbou



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THE SCRIPTURES

Psalm 46:1-3

“God is our refuge and strength, an ever-present help in trouble. Therefore we will not fear, though the earth gives way and the mountains fall into the heart of the sea, though its waters roar and foam and the mountains quake with their surging.”

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The cold climate experienced over the larger part of Southern Africa calls for an increase in greenhouse heating to maintain the necessary productive grow climate. In essence, this increases the input expense to greenhouse operators who are already under stress because of load shedding and rising coal prices. There is a major shift towards solar energy to compensate, but many growers stare blankly at the initial investment capital lay-out. Being in farming, whether on open land, irrigated land or undercover farming, we are all termed "businessmen". As such, we should realize the long term implications of our production prospects. Having experience over many years of highs and lows in markets, adverse climate conditions and what not, my humble opinion is to look at the future and long term solutions. Financial institutions are already willing to finance forward planning solution such as solar fitments, climate control, expansion greenhouses or shade net structures because of the ever-growing consumer demand plus our return to higher export markets. There are certainly systems falling in to place that combat past negative agricultural activities and our younger, modern-thinking producers are much more broadminded about new possibilities. We are all looking forward to a beautiful (and bountiful) spring and growing season ahead. Chin up guys, and put your thinking caps on – South African farmers are still world-wide recognized for their tenacity and top quality produce! 🍷

John Swiegers

GREEN BEANS PRODUCTION in a Greenhouse



The beans are ready for picking from ten to twelve weeks after sowing, depending on weather conditions. Once the pods have started to form, check them daily, as they mature quickly.



Make sure the plants are kept growing in a reasonably moist atmosphere, otherwise red spider mite could become a major problem, and ensure that the greenhouse cover is as clear as possible, to allow maximum light to reach the plants.

Green beans, whether pole beans or bush beans, can be grown in a greenhouse if given good soil, abundant light, regular moisture, and temperatures that do not get too hot. Green beans grow best in temperatures between 16°C and 13°C.

A heated greenhouse maintaining an air temperature of 16°C and a minimum soil temperature of 13°C (55°F), allows the producer to grow good crops of French beans out-of-season in the borders. Greenhouses which are glazed down to ground level are best, as the French beans need plenty of sunlight. In South Africa though, you can also grow them in tunnels or multispan, but only if you farm in a really warm and sunny climate area.

Sow the seeds in good quality seed compost, with enough heat, any time from late summer to late winter. Expect cropping from late autumn through to late spring or very early summer. For minimum root disturbance during transplanting, use peat pots or sow the seeds directly onto soil blocks.

Once the first pair of true leaves is showing, transplant them into the border or frame. The soil should not be too rich, or the plants will make excessively leafy growth at the expense of pod formation. Ideally, soil which has been fertilized from a previous crop is best.

Space the plants 22 cm apart, in single rows 30-37.5 cm apart in

frames and in double rows about 30 cm apart in the borders. Climbing varieties grown in the borders will need support. Use strong garden twine, fixed vertically to two parallel, horizontal wires. The top wire can run under the roof, and the lower one should be about 15 cm from the ground. Two plants will climb up the same string.

Harvesting

The beans are ready for picking from ten to twelve weeks after sowing, depending on weather conditions. Once the pods have started to form, check them daily, as they mature quickly. Most varieties are best when about 10 cm long. Unless you are growing the crop specifically for the seeds (either green, as flageolets, or ripe and dried, as haricots) do not allow the ripe pods to remain on the plant. Daily picking will ensure that cropping continues for five weeks, or more.

When tested, pods ready for eating will snap cleanly in half, without any stringy fibres. The beans inside will be visible, but will not have expanded to their full size. Cut the pods from the plant with scissors or

secateurs. You can also sever them with thumb and fingernails. Never try to pull the pods off; the plants are very shallow-rooted and you may pull the whole plant out of the ground.

Haricots

The beans of some varieties, if left to ripen fully, can be dried and stored for winter use. In mid-autumn, when the pods are pale brown and beginning to split, the beans are ready for harvesting.

End of grow season

When cropping is over, cut off any remaining growth above ground level. If it is healthy and free from insects, place it on the compost heap. Otherwise, burn all stems and foliage to minimize the spread of pests and diseases. As with all leguminous crops, French bean roots will increase the nitrogen content of the soil as they decay. This is particularly important if the following crops grown on the site are nitrogen-hungry, such as brassicas etc.

With the extensive culinary demand for greens, this product is a simple product to grow, have large market potential providing as always, the greenhouse management is strictly adhered to. 🌅 JS

Greenhouse Production and Solar Power

Agriculture plays a major part in our economy, livelihood, and the environment. Solar technology along with traditional farming holds numerous benefits and enables farms to become self-sustaining, increasing crop yields and reducing electricity and water consumption. It is the future, using solar technology together with traditional farming.

The many advantages of agrivoltaics are sustainability, increased food, and energy production. It adds to the rehabilitation of damaged land, improves the microclimate of the farming process and the social impact on communities. To be able to achieve this, the system must be strategically positioned and laid out, by considering the type and nature of the crops. The tilt angle of the solar module is the main concern when placing PV modules. There are three typical setups

1. Interspersed between crops
2. Raised and tilted panels
3. Greenhouse arrangements

Solar panels that are placed over crops give shade to low-light plants. The solar module arrangement and placement will transmit partial light and will protect the crops from possible light-related damage and in turn, the plants cool the solar system when they perspire. Placing the modules over the crops also allows the sun's energy to be used twice; for the growth of the crops and to generate electricity, which

can be used on the farm to power irrigation, agriculture equipment and refrigeration, meeting the demands of the farm. By using renewable energies farmers support their livestock's health with the improvement of the local air quality.

Photovoltaic arrays produce much less carbon dioxide and pollutant greenhouse gas emissions than the traditional farms of power generation. The dual use in agriculture and energy production could mitigate competition for land resources, minimizing the pressure to transform open land into farms, preserving biodiversity.

The key challenges are the high expenditure requirements for installations, but the financial benefits do pay off over time. More concerning are the uncertainties due to a lack of clear policies. The need for specialized equipment and skilled workers also poses a problem.

South Africa has great potential for the implementation of agrivoltaics with its huge farming culture. The conditions in South Africa are highly suitable for the large-scale implementation with its plentiful farmland that can be reconstructed for agrivoltaics. Crops in South Africa that prefer partially shaded conditions include tomatoes, beans, lettuce,

potatoes, certain grape varieties, hops, spinach, and legumes.

An example of an agrivoltaics installation in South Africa, is the SUNFarming installation in Potchefstroom harnessing the power of solar. The project began in 2016, and produced tomatoes, spinach, cauliflower and other herbs. The project is made up of three solar tunnels/greenhouses, and no soil is needed to grow vegetables and drip irrigation is used to water the crops. The solar tunnels produce much higher yields when compared to conventional farming. In partnership with the University of Potchefstroom, the first solar training centre in South Africa was established in 2013, which provides the necessary skills for PV technology.

Agrioltaics will be an important part of the future of agriculture and our resources will be more sustainable through its implementation. While taking shape in countries such as China and Europe, it is still in its infancy in South Africa. It might be a new term for many farmers, but it is an exciting new technology and opportunity with impressive results that will make a significant impact on the farming sector. 🌅

Author: Marisan Hallett



In a country where load shedding is prevalent, greenhouse operators have to go the extra mile to survive. Solar panels or photovoltaic system such as the above is the answer.

LIFE IS SURPRISINGLY SWEET – THE AMAZING SWEET PALERMO® STORY

Introducing Sweet Palermo®, the internationally renowned brand of dulce italiano pointed sweet peppers brought to you by Rijk Zwaan, a leading vegetable breeding company. These peppers are a true delight, boasting a unique combination of looks and taste that sets them apart from the rest. Prepare to be surprised by their exceptional sweetness and an aromatic richness that elevates any dish they grace.

But don't just take our word for it. At Rijk Zwaan, we firmly believe in cultivating a healthy future for all, involving every participant in the fresh produce value chain. To achieve this, we continuously stay attuned to worldwide consumer trends and market demands. We conduct extensive consumer research projects and host competitions where we let the consumers speak for themselves. And the result? Seven consumer awards in the past decade, starting from 2012. The latest accolade is the prestigious 2022 Taste of the Year award from Spanish consumers.

When you choose Sweet Palermo®, you opt for a product that caters to your desires as a consumer, providing a wholesome yet irresistibly tasty alternative. Compared to regular blocky peppers with a brix value of 6-7, Sweet Palermo® boasts an impressive brix value of 8-9.5, making it a genuinely sweet and flavourful treat. Additionally, the fruit is blessed with minimal seeds, making preparation a breeze.

The cultivation of Sweet Palermo® fruit is a meticulous process entrusted to hand-picked selected growers forming the esteemed Sweet Palermo® Growers Group. As a grower partner, they gain exclusive access to the latest Rijk Zwaan

varieties that meet the stringent standards set for this premium brand. Each Sweet Palermo pepper is hand selected, hand-picked and packed into specially marked Sweet Palermo® bags. If it doesn't clearly say Sweet Palermo®, it's not. This dedication to excellence ensures that only the best produce reaches your table through dedicated retailers such as Woolworths, Freshmark and Pick & Pay. Originally, Sweet Palermo® started with the vibrant red variety, but the line has since expanded to include the vibrant colours of yellow and orange. The newest addition to the palette is the sumptuous chocolate-coloured Sweet Palermo®. Each of these varieties undergoes rigorous testing before bearing the Sweet Palermo® name, ensuring they possess the necessary resistances, plant physiological attributes, and yield traits that make them successful commercial crops for growers.

Discover the vibrant spectrum of Sweet Palermo® peppers, each with its distinct flavour profile, adding a burst of colour and taste to your culinary creations. Whether you're preparing a fresh salad, a hearty stir-fry, or a sizzling fajita, Sweet Palermo® peppers are the perfect companion, adding a touch of sweetness and elevating your dishes to a whole new level of deliciousness.

When you choose Sweet Palermo®, you're making a conscious choice to embrace healthy eating without compromising on taste. These peppers embody the perfect harmony between health and indulgence, making them a favourite, not only among health-conscious foodies and gourmards alike, but children just love Sweet Palermo® peppers whether raw or cooked.

To experience the Sweet Palermo® difference for yourself, visit our website at www.sweetpalermo.com. There, you can explore the diverse range of flavours and find inspiration for incorporating these delightful peppers into your daily cuisine.

Join the Sweet Palermo® movement and embark on a culinary adventure like no other, surprise your friends when you open your fridge and they see these vibrant new variety sweet peppers that they saw on television during morning breakfast cooking shows. Experience the joy of cooking with nature's naturally sweet treasure, elevating your dishes to new heights. Embrace the Sweet Palermo® lifestyle and savour the sweet side of life. Your taste buds will thank you, and your meals will never be the same again. 🌅





TOGETHER WITH OUR PARTNERS...

we actively contribute to the world's food supply and stimulate vegetable consumption by laying the foundations for healthy and appealing vegetables.



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SEAWEED (KELP)

IMPROVES GREENHOUSE PLANT'S GROWTH AND PRODUCTION

Seaweed and kelp are types of marine algae that are commonly used as natural fertilizers in hydroponics production. These algae are rich in essential nutrients, vitamins, and minerals that are beneficial for plant growth and health. Seaweed and kelp can be harvested from the ocean or cultivated in seawater farms, and are available in various forms such as liquid concentrates, powder, or granules.

The most important benefit of adding seaweed or kelp to your hydroponic nutrient solution is its ability to improve plant health. Seaweed and kelp contain trace amounts of many different minerals including calcium, magnesium, potassium, iron, manganese, zinc, and boron.

These nutrients help your plants grow stronger roots so they can absorb more water from their growing mediums. In addition to improving plant health by providing vital nutrients for root development, seaweed also contains high levels of natural sugars which act as an excellent fertilizer source for plants during flowering stages when they need extra carbohydrates for energy production.

Important benefits

When it comes to growing plants in hydroponic systems, there are numerous options for choosing the right nutrient additive. However, seaweed and kelp additives are some of the most popular choices for gardeners who want to improve their crops' health and yield.

Seaweed and kelp additives have many benefits for hydroponic plants. Here are some of the most significant advantages:

It improves Nutrient

Uptake: Seaweed and kelp contain a variety of organic compounds such as amino acids, cytokinins, auxins, and gibberellins that enhance the plant's ability to absorb nutrients from the hydroponic solution.

Enhances Root Growth: The plant growth hormones present in seaweed and kelp additives stimulate root growth and development, which lead to better nutrient uptake and overall plant health.

Resistance to Stress: Seaweed and kelp additives contain antioxidants and other compounds that help plants to better tolerate stress caused by environmental factors such as high temperatures, drought, and pests.

Improved Yield: The use of seaweed and kelp additives has been shown to increase the yield and quality of hydroponically grown crops such as lettuce.

Applying seaweed to hydroponic plants is a simple process that can be done in various ways. Here are some of the most common methods:

Liquid Concentrate: Seaweed and kelp are available in liquid concentrate form that can be added directly to the hydroponic solution. Follow the instructions on the product label to determine the appropriate dosage based on the size of your hydroponic system and the type of plants you are growing.

Foliar Spray: Seaweed and kelp can also be applied as a foliar spray, which involves spraying a diluted solution of the liquid concentrate directly onto the leaves of the plants. This method allows for the quick absorption of nutrients and can be especially useful for plants that are experiencing stress.



The auxins in kelp largely improve root, growth and therefore fruit production in greenhouse produce. As auxin is found in all root growing plants, albeit in very small particles, the added kelp auxin augments the plant extensively.



What kelp looks like in its natural state.

During the Vegetative Stage: The vegetative stage is when plants are actively growing and developing leaves and stems. Seaweed and kelp additives can be particularly beneficial during this stage, as they promote healthy root growth and help to improve the overall health of the plant.

After Transplanting: When transplanting seedlings or mature plants into a hydroponic system, adding seaweed and kelp to the hydroponic solution can help to reduce transplant shock and promote healthy growth.

During Stressful Conditions: When plants are exposed to stressful conditions such as high temperatures or drought, adding seaweed and kelp to the hydroponic solution or using a foliar spray can help to improve the plant's ability to tolerate stress and recover more quickly.

Seaweed and kelp additives are an excellent way to provide your hydroponic plants with the nutrients they need to thrive. 🌱 JS



Macro- and micronutrients for the greenhouse system

Growers who use plastic-lined dams or 'portapools' 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 possibility 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 ($EC < 0.3 \text{ mS cm}^{-1}$) 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, such as shown in the picture, algae will remain to be a problem.

Where the shading is not sufficient, such as shown in the picture, algae will remain to be a problem.

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 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 contents of one bag are 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 100x concentrated. 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 $\pm 0.3 \text{ mS cm}^{-1}$ 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. 🌱

More about this subject in future editions of Undercover Farming. Information by kind permission of Dr J Combrink, Stellenbosch.

HARNESSING the power of DRONES in horticulture



Managing growth of greenhouse crops by using a drone.

As technology continues to reshape industries across the globe, the horticulture sector stands on the brink of an exciting transformation: the use of drones. These remarkable machines possess the power to revolutionize the way tasks are performed in horticulture, offering increased efficiency, improved precision, and the ability to accomplish tasks previously too difficult for conventional methods.

Drones provide a remarkable opportunity to automate and streamline various tasks, reducing reliance on skilled labor. For example, drones can effortlessly shade greenhouses or precisely apply fertilizers to crops in fields deemed too wet for tractors to navigate. With drones, operations continue seamlessly and safely.

Currently, in the UK, drones have found primary applications in three crucial areas:

Shading paint application: Drones efficiently apply shading paint to protect crops from excessive sunlight. A job previously done by workers on the roof of the glasshouse is made significantly safer, more precise, and faster.

Fertiliser application: Drones armed with sensors and advanced imaging technology analyze crop health and detect nutrient deficiencies. The data collected is utilized to apply fertilizers and other necessary nutrients or biostimulants with pinpoint accuracy, targeting specific areas of the crop and optimizing inputs.

Reseeding inaccessible areas: Drones offer a ground-breaking solution for reaching areas previously deemed inaccessible or too hazardous for reseeding, such as steep roadsides.

Leveraging their agility and precision, drones effectively distribute seeds in these challenging locations, contributing to vital restoration efforts.

While these uses for drones are already impressive, regulatory barriers exist when it comes to the application of plant protection products (PPPs). Strict adherence to guidelines and regulations is crucial to ensure environmental and human safety. Yet, efforts are underway to obtain authorizations for drone applications of certain products. Close collaboration between manufacturers, operators, and regulatory bodies is vital to ensure compliance and promote responsible drone usage in horticulture.

Large potential of drones
Looking ahead, the future potential of drones in horticulture is vast.

Disease and pest monitoring and spot applications: Drones equipped with high-resolution cameras can swiftly detect early signs of disease or pest infestation in crops. This early detection enables prompt intervention, reducing crop losses and minimizing the need for extensive pesticide use. Furthermore, drones can be deployed for targeted spot applications of pesticides, ensuring precise control with minimal environmental impact.

Application of biological controls:
Drones possess the capability to effectively distribute beneficial insect species over vast areas, offering a more consistent and efficient alternative to manual applications. This innovative technology could play a pivotal role in integrated pest management strategies.

The integration of drone technology in horticulture holds immense potential to change common industry practices. Driven by the need for increased efficiency, productivity, and precise crop management, the potential for drones is huge. Despite regulatory challenges, collaborative efforts among stakeholders can overcome barriers related to the use of plant protection products.

Looking ahead, drones have the potential to transform horticulture even further, playing a vital role in disease monitoring, yield estimation, reduction of environmental impacts, and improving input efficiency. By embracing drone technology, the horticulture sector can unlock new levels of productivity, sustainability, and profitability, paving the way for a bright future. 🌱

Drip Irrigation for Greenhouse Vegetable Production



Soil Moisture Control

Automatic Drip Irrigation is a valuable tool for accurate soil moisture control in highly specialized greenhouse vegetable production. Total automation of drip irrigation offers a simple, precise method for sensing soil moisture and applying water. Management time savings and the removal of human error in estimating and adjusting available soil moisture levels enable skilled growers to maximize net profits.

Available soil moisture is an important limiting factor in growth and productivity. Greenhouse vegetable growers commonly estimate the availability of soil moisture by plant and soil appearance. Slight wilting of succulent terminal leaves indicates water stress in plants. Growers squeeze handfuls of soil taken from near the surface at several locations in the greenhouse. Soil that does not stay compressed in a tight ball is considered too dry.

Water deficiency can be detrimental to plants before visible wilting occurs. Slowed growth rate, lighter weight fruit and, in tomato, blossom end rot often follow slight water deficiencies. Replacing traditional methods of estimating available soil moisture with a more accurate method is necessary to maintain optimum soil moisture levels.

Conventional irrigation methods usually wet plant's lower leaves and stems. The entire soil surface is saturated and often stays wet long after irrigation is completed. Such conditions promote infection by grey mould-rot (*Botrytis*) and leaf mould fungi.

Most greenhouse vegetable plants remove large amounts of water from soil at the 10" to 12" depth. An accurate estimate of available soil moisture at this important depth cannot be made by testing the top few inches of soil. In a greenhouse on a sunny day, transpiration and evaporation can occur so rapidly that excessive water loss can cause plant

damage before sufficient water can be applied to correct moisture stress. Water stress, no matter how slight, will cause a significant reduction in harvest weight.

Drip irrigation is a slow water delivery system in which water can be applied, drop by drop, to the soil surface near the base of the plant. A properly designed automatic drip irrigation system can remove much guessing about when to irrigate and how much water to apply. Water is applied whenever the sensor indicates a sub-optimum soil moisture level. Using automatic drip irrigation systems, skilled greenhouse managers can:

- Apply correct water amounts precisely when required to maintain optimum available soil moisture in the root zone.
- Reduce management time required for observing plant water needs and manually controlling irrigation systems.

◀ DRIP IRRIGATION from page 11

- Keep leaf surfaces and stems drier because water drips directly on the soil instead of spraying in the air.
- Prevent water puddling and splashing by applying water no faster than it will percolate into the soil.
- Reduce incidence of leaf mold, gray mold-rot and other foliage diseases.
- Reduce evaporation losses and fruit deterioration by keeping more soil surface dry.
- Increase production if other factors are not limiting.

Planning a Drip Irrigation System

Uniform water application, operating convenience and minimum cost are important objectives in planning a greenhouse drip irrigation system. Carefully study this section's ideas on achieving these objectives before selecting drip irrigation system components.

Divide the total greenhouse area into equal or similar sections or into individual houses. Plan irrigation systems so that each house or section can be irrigated independently. Plan total irrigation systems in conjunction with other greenhouse water needs to prevent exceeding water supplies.

The total amount of water available for all greenhouse uses, often described in gallons per minute, is

a useful figure. Using a portable water meter, the well or other supply source usually can be measured. Water delivery rate from small wells often is determined by measuring the time required (in seconds or minutes) to fill a container of known volume. When greenhouse water requirements exceed the well delivery rate, a storage tank can increase the quantity available during the peak usage.

Water Requirements

Drip irrigation requires less water than lay-flat perforated hose, flooding or other frequently used water distribution procedures. Plan irrigation piping for each separately irrigated greenhouse section or individual greenhouse to distribute 1.6 to 2.4 gallons per minute for

each 1,000 square feet. This is 8 to 12 gallons per minute for each 5,000 square feet of growing area. Less water may not fully pressurize the irrigation system piping, causing uneven water application. Uneven water distribution often creates dry or over wet areas.

Soil texture controls the rate at which water can be absorbed by the soil. To prevent puddling and runoff, plan lower water delivery rates for heavy clay soils with characteristic lower water intake rates. Be careful to plan the water delivery rate to be no greater than the soil water intake rate. 📌

By: Roland E. Roberts. Extension Irrigation Specialist and Vegetable Specialist



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MORE ABOUT GROWING SEEDLINGS: THE GOLDEN RULES



Typical seedling tray with even germinating seedlings.

Germination and growing requirements for flowers, vegetables and herbs from seed can vary depending on the type of plant grown.

With moisture, light, fertilizer and other considerations, there are many factors that influence germination and subsequent quality of seedling growth. However, there are also some common environmental growing conditions that can be applied to all seedling crops to produce quality seedlings/plugs.

Growing Medium

There are many types of seed germination media available for seedling production. These products are composed of fine peat, perlite or vermiculite.

Germination media formulated with

fine perlite dry out a little faster than the ones formulated with fine vermiculite.

Fine perlite germination media are ideal for winter and high humidity production, whereas those with fine vermiculite are ideal for late spring through early fall or in conditions where the growing medium dries out rapidly.

Specific medium menu

Also consider the plant's growth rate and susceptibility to root diseases. Tomatoes, lettuce, impatiens, marigolds, zinnia, basil, etc. may perform better in a fine peat-fine vermiculite germination medium while spinach, thyme, begonia, pansy, vinca prefer a faster drying fine perlite-fine peat germination medium.

The Right Plug Trays

Select plug trays or open flat trays depending on your seedling and transplant needs. Shallow plug trays hold more water throughout the profile of the cell.

Deeper trays hold less water throughout the profile of the plug, therefore provide greater air space for developing roots.

It is important to fill trays uniformly, taking care not to compress growing media into cells since this can result in uneven air space and water holding between cells causing uneven seed germination.

Controlled Environment

Most seeds germinate well at a media temperature of 22-25 °C, although some crops do better at

◀ MORE ABOUT GROWING SEEDLINGS: from page 13

a cooler or warmer temperature. Check with the seed company for the optimum temperature for seed storage and seed germination.

Maintain proper moisture content and minimize temperature fluctuations during germinations.

Seeds in Humid Environment

The goal when germinating seed is to keep continuous moisture near the seed.

This can be tricky, because too much water can cause the seed to rot as well as encourage algae growth and attract shore flies.

Reduce Moisture during Germination

Once the seed germinates and sends the radicle down into the

growing medium, it is important to start reducing the amount of moisture maintained in the growing medium by decreasing mist frequency or frequency of boom or hand watering.

Remember the wettest portion of a germination medium is at the bottom of the cell.

If the growing medium is continuously saturated/overwatered and the cells are deep, it is possible that few roots will grow to the bottom of the cell due to lack of oxygen.

Keep substrate Dry Between Watering

Once the roots reach the sides and bottom of the cell, the surface of the growing medium needs to dry between watering and misting should be discontinued. If the germination medium is predominately peat moss, then the surface of the growing medium should lighten to light brown when it is time to water.

Humidity should also be reduced, and more air flow needs to be introduced to help produce harder, more compact growth.

Fertilize Seedlings Timeously

Most germination media come with a starter fertilizer charge, so fertilizer does not need to be applied until the first set of true leaves emerges.

At this point, nutrients may have been used up or leached from the growing medium, so fertilizer

should be applied as a continuous feed, starting at 25-50 ppm nitrogen, then increasing to 75-100 ppm nitrogen prior to transplant.

Suitable Fertilizer

The type of fertilizer used should be matched with the alkalinity of the water and the nutrients provided or not provided by the water.

The Electrical Conductivity should be less than 0.75 mmhos/cm during the first few weeks and eventually end up at 0.75-1.25 mmhos/cm prior to transplant. The pH of the seedling medium should be 5.5-6.2.

Young plugs

Using a value-added growing medium with Bacillus makes it possible to produce stronger and more resistant plants.

The Bacillus bacteria help to suppress plant pathogens that can cause damping-off during seed germination and plant establishment. This active ingredient helps to produce quality plants and to reduce seedling loss.

There are, of course, other variables to consider when germinating and producing seedlings, but these key elements have the advantage of applying to all plants started from seed.

By putting these basic tips into practice, it can help reduce errors and improve crop quality. 🌱 JS



Greenhouse sanitation in progress.
Pic Greenhouse Grower



Cleaning up old plant material, making sure no residues of possible diseases is left behind. Pic Farm Biosecurity

PREPARING THE GREENHOUSE FOR THE NEW SEASON

The darkest days of winter are slowly winding down, and spring is just around the corner. This is the perfect time to get your greenhouse set up for the exciting growing months ahead. When preparing your greenhouse for another season, it should be done in a step by step way to ensure the new crops are welcome and begin its life on the right foot.

Declutter Your Greenhouse

Dead plants and old leaves are hotspots for diseases and mould growth. If they look fine, you can compost them; however, if they show any signs of disease – make sure to burn them to prevent the spread of bacteria to your new plants. Over the winter months, many bugs and slugs may have decided to call your greenhouse home and escape the icy chill outside.

Take time to examine the floors, walls, any furniture and tools, and send those pests on their way. Carefully inspect every item in your greenhouse to check if anything needs fixing or replacing. This includes pots, benches, shelves, seed trays, grow beds, and more.

Deep Clean the Growing Space

Dust off any winter cobwebs and get your greenhouse looking shiny and new again. For best deep-cleaning practices, we recommend that you sweep the floor to get rid of any

dirt and dust that has collected. Wash the interior and exterior of the polycarbonate panels with a sponge and warm, soapy water. Use a sponge with water and mild liquid soap to wipe down the frame, workbenches, shelves, and other surfaces. Disinfect your pots, seed trays, and tools, thoroughly rinsing them. Allow them to air dry.

Check Ventilation Flaps and Doors

Proper greenhouse air circulation is essential to avoid springtime plant diseases and ensure your production will thrive. If you already have installed windows, try opening and closing all of them to confirm that they are functioning well. If you have an automated climate control system that needs attention, have it serviced before plants enter the greenhouse,

Check Your Water Source

Before you start planting, it's always a good idea to check your water source. Pipes can freeze over during the frosty winter months, or other unexpected issues can arise. Once you've confirmed that your water source is working correctly, it's important to ensure that it's easily accessible from your greenhouse. It is advised to set up a proper automatic watering system.

Get your beds or Grow media Plant-Ready

Healthy soil is absolutely essential for a successful growing season. If you plan on reusing the soil from your

last crops, there are a few steps you can take to guarantee it's filled with nutrients and completely plant-ready.

Break up compacted dirt by running a garden fork through your plant beds. This helps to aerate and fluff up the earth, making it easier for new life to grow and water to drain. Once you have an understanding of your soil's health, it's time to mix in any necessary amendments, such as natural fertilizer, elemental sulphur, compost, peat moss, or ground limestone rock.

Climatise Your Greenhouse

If you're eager to get production up and running and want to use your greenhouse to start growing earlier – then now's the time to warm up your space. A good climate control system can lengthen your production season and diversify the kind of plants you can grow.

During the chillier months, you should aim to keep the temperature at 4°C or above. This will ensure your greenhouse stays frost-free. However, if you want to use your space for germinating seeds, we suggest keeping your greenhouse between 21-27°C making sure night time temperatures don't drop any lower than 10-13°C. Just make sure that all your windows are completely closed, so you don't experience any unnecessary heat loss.

Proper preparation before new plantings is half-way to your new season's success! 🌱 JS



UV ROBOT AGAINST POWDERY MILDEW

Powdery mildew is a fungal disease that affects plants in all growing scenarios though it particularly affects fruit grown inside poly-tunnels. The infection spreads through spores carried on the wind resulting in a white powdery coating on the plant and significant yield loss.

Control of powdery mildew is usually achieved with the use of fungicides, but with increasing resistance, high costs, and their detrimental effect on the environment and human health, this is becoming increasingly unusable.

In 2005, the Dutch company, CleanLight developed an alternative to these fungicides based on UV light. Today in 2023, over 5000 growers in 40 countries use CleanLight to protect their crops using this sustainable technology.

In 2019, the UK-based Antobot began developing autonomous

robot platforms and the supporting infrastructure to provide agri-tech solutions to on-farm issues.

The platforms are controlled by the one-of-a-kind "robot brain," the universal Robot Control Unit - uRCU®, to keep intelligence, affordability, and flexibility at the core of the technology.

Pairing CleanLight's UV technology with Antobot's autonomous robot platform allows the UV-C to be easily applied to plants several times per week to effectively prevent the disease.

The exact dosage of UV is carefully calibrated to apply the right amount at the right time to remove the requirement for fungicides.

The UV robot is fully autonomous and built to operate primarily in poly-tunnels and open fields without the need to travel on a pipe rail system, as is common in greenhouses.

With a treatment speed of around 2km per hour and battery swap technology, one UV robot can keep the disease under control in a growing area of approximately 4 hectares. 🌱

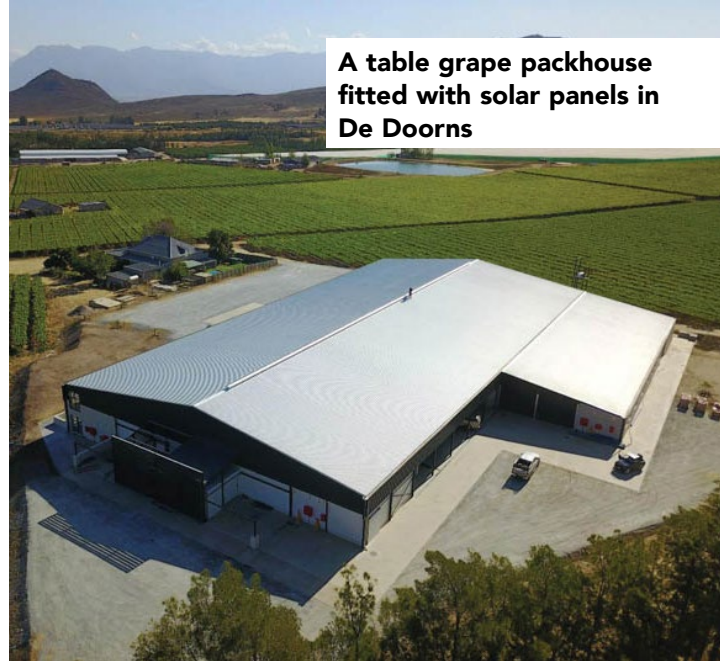
Source: Fresh Plaza

IMPORTANCE OF PROPER REFRIGERATION

Inside a table grape facility using solar power near Groblersdal.



A table grape packhouse fitted with solar panels in De Doorns



Located near Groblersdal in Limpopo, the region known as the Golden Mile is where some of the country's best export-quality citrus fruit and grapes are grown. This is also where new standards are set for the cultivation and storage of export-grade produce. It is therefore little wonder that the demand for state-of-the-art refrigeration solutions is higher here than anywhere else in the country.

The Golden Mile is essentially the one-mile radius around the highest point in the Groblersdal area, the N11 between Groblersdal and Marble Hall. It has its own microclimate, which makes it ideal for the production of some of the best fruit in the country.

The demand for export-quality produce from this small region is so high that property prices have skyrocketed in recent years.

The farmers who invest their time and capital into operations here sell a high-quality product, and they expect refrigeration systems that are up to the task.

That's why one would be hard-pressed to find a farm that uses older technology.

Refrigeration is central to the production flow on these farms. The produce has to be cooled overnight to the right temperature by the time that the trucks arrive to ensure that they can make it to their destination without spoiling.

This requires that the cooling rooms run at peak efficiency, with no downtime.

These facilities stand idle for just about three quarters of the year, and then they have to ramp up to 24-hour operation for about three months, and outsourcing is more complex.

Fully outsourced solutions are most viable if your facility operates for at least eight months of the year. The farmers therefore own all of the refrigeration systems on their sites.

Geographical distance is one of the biggest challenges faced by service providers. Firstly, maintenance

crews need to be on-site quickly, meaning that they have to be set up and ready to be dispatched within minutes of getting a call. Secondly, the far distances of these farms from infrastructure such as grid power are a major issue.

The further that these facilities are located from town, the weaker their power supply is.

With severe load shedding as it is currently experienced facilities simply cannot function with the low voltage that they sometimes get from the grid.

As a result, most of these facilities have now started to incorporate solar power and batteries with their refrigeration systems. It is actually an ideal match in the end.

Solar power is an additional investment in any business, but ensures the continuity of supply, running of the business and if finances are well-managed paid off soon by the company which is known for its continuity and quality. **JS**



A basic Aquaponics system to grow herbs.

AQUAPONICS BASICS TO CONSIDER

The Aquaponics system is a method of growing food that combines aquaculture (the practice of raising fish) and hydroponic (a soilless way of growing plants). Through the combination of these two growing methods, aquaponics offer a way to grow food that is resource-efficient, environmentally friendly, and yields high-quality produce.

How it works

In aquaponics, the waste produced by fish is converted by the beneficial bacteria into nutrients that plants absorb. The plants, in turn, filter the water for the fish.

This creates a closed-loop system that uses 90% less water than traditional agriculture and can produce fish and vegetables in a small space all year round.

Aquaponics relies on a mutually beneficial relationship between fish and plants. This process involves fish excreting waste that is broken down into vital nutrients that the plants use for nourishment. The plants, in return, act as natural filters, thus purifying the water and allowing the

fish to thrive in a clean and healthy environment.

Advantages of Aquaponics

Aquaponics continues to gain popularity among farmers, gardeners, and sustainable food enthusiasts because of the many benefits it provides. The following are some benefits of aquaponics.

Aquaponics uses less water than traditional growing method and doesn't rely on harmful chemicals or pesticides to produce fresh and healthy harvests of fish, fruits, herbs, and vegetables.

An Aquaponics system can produce a high yield of both fish and plants in a small space all year round (if done in an indoor setup). Plants grow

faster in aquaponics systems because of their constant access to nutrient-rich water.

Fresh, Nutritious Produce grown in a Aquaponic system can grow a variety of fresh produce that is high in nutrients and free from harmful chemicals. Because the plants grown in aquaponics are free from fertilizers and other chemicals.

Aquaponics use up to 90% less water than traditional agriculture because the water is recycled through the system.

Once fully established and working, aquaponic systems are easy to maintain and require less work than

traditional agriculture. Aquaponics can be an excellent tool for teaching children and adults about sustainable agriculture and science that is related to biology, chemistry, and physics.

Important factors to consider

Choose an aquaponics system that you want to implement. You can choose between media-based systems, raft systems, NFT systems, or a combination of these systems.

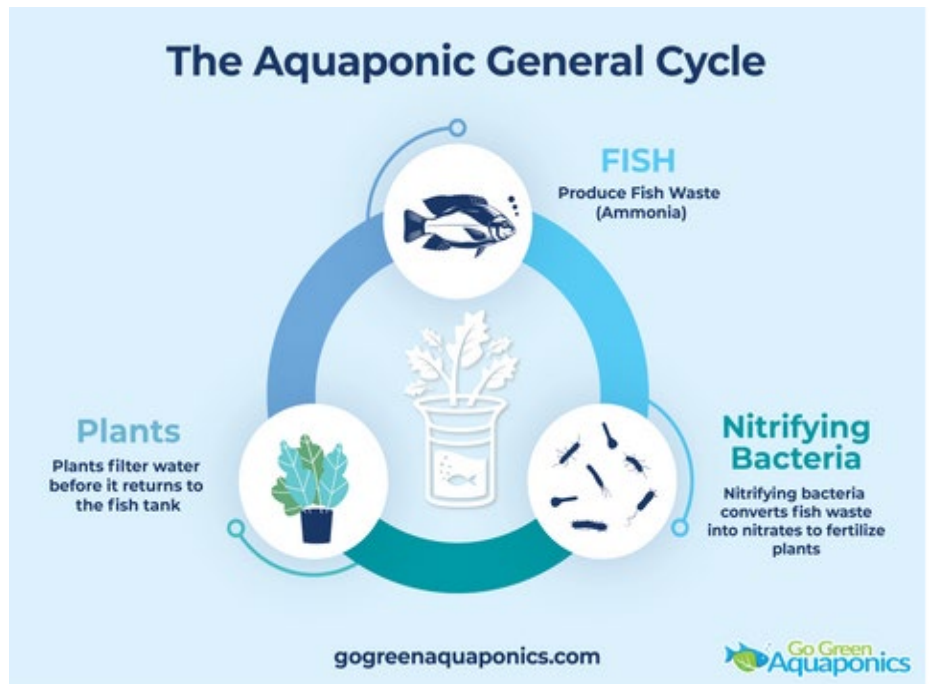
Decide what are the goals and purpose of your aquaponics system?

What is the purpose of your aquaponics system? What plants or fish are you planning to grow and raise? Are you going to eat your fish? These questions should be given thought to plan your system correctly and know what method will meet your goals and purposes.

The Environment

Humidity in an aquaponics system, with water flow being constant, take in consideration your space's natural evaporation and increased moisture. The fish tank or aquarium can leak. Therefore, the area where you want to create your system is an area that can get wet.

Plants need light to grow. All plants require sunlight for photosynthesis, which converts light, oxygen, and water into carbohydrates (energy).



Plants need this energy to produce, bear fruit, and bloom.

Location

Here are some key considerations when choosing a location for your aquaponic system. Plants require enough light to grow, so choose a location where natural light or sunshine is accessible. Choose a location where the temperature can easily be regulated. Consider installing a heater or air conditioner to maintain a consistent temperature.

Your aquaponic system will require a constant water supply, so choose a location near a reliable water source. Also, ensure that your location

has adequate drainage to prevent water from accumulating around the system.

An aquaponic system will require an electrical outlet to power the water and air pumps. So choose a location near an outlet or consider using an extension cord to reach a nearby outlet. Proper ventilation is vital to prevent the buildup of humidity and to ensure that there is adequate airflow for the plants and fish.

Various suppliers and training institutions can help with the nitty-gritty of starting you off with aquaponics so, with good management, your system takes off well! 🌱 JS

DON'T LOSE OUT ON IMPORTANT ADVICE FOR GREENHOUSE PRODUCTION!

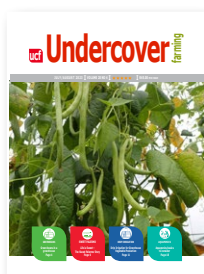
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