The Ultimate Guide to Growing Microgreens

By the Nick Greens Grow Team

TABLE OF CONTENTS

Rules for growing microgreens indoors

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https://www.nickgreens.com/single-post/2018/02/23/Rules-for-growing-indoors

Next winter you'll most likely want to grow microgreens outdoors(kidding). Or you might already know how to grow but need a little help (or you just don't want to admit why your microgreens died); either way we will be giving you some rules to follow, while you travel on the road to success.

Equipment & System Needs

The **Heating System** hoophouse is passive solar heated, which works fine for starting plants in earliest spring, but for growing a consistent crop of microgreens during cold and low solar months of winter, it needs to be supplemented. After research that was done, it was determined that heat mats were the most efficient direct heat option. There are several options to heat the water: electric, solar and bio gas.

Water is an essential component for microgreens needs, which constantly needs to be kept at an ideal moisture level. This then makes the water accessible for the growing area. Watering equipment for our system remained pretty simple: long hoses which run along the length of a table with long neck spray nozzles that release a gentle shower. These happened to be the most flexible performers and provided good coverage.

Ventilation by large fans is essential to prevent fungus in winter and keep microgreens cool in summer. They act to keep the growing constant. Ventilation is essential to the success of the growing operation.

Working towards developing a system for your clients based on climate, farm setup and prospective buyers

To keep track of all the crop varieties in trials, you should develop a simple log to track all the pertinent information for each trial. Document the date of the seeding, the media used, tray size if used, quantity of trays, whether you applied heat or not, quantity of seed used per unit, harvest yield and harvest date. With solid note-taking, you will be better able to track the successes, failures and troubleshooting, to minimize the latter. So, we recommend this as a practice. Documentation was important not only in trialing seeds, media, and growing conditions, but during later steady commercial production as well. Keeping good notes, not just numbers on all the variables, was key to seeing what types of systems worked best in our setup.

Growing Medium

You'll have to decide what you want to use for soil. Whether it'd be Coir or potting soil. You'll have to decide which is best for you and figure out the ratio that best suits your growing needs. Be sure to always experiment in this stage. Mark from Vertical veg says, "using old compost will help because of the nitrogen that aids leafy vegetables."

Harvesting

You can experiment with microgreens to find the stage you like best – either when the first pair of leaves appear, or later, when a few leaves have grown. One exception is sunflower shoots. These need to be eaten before their second pair of leaves appear, as these are bitter. The easiest way to harvest most microgreens is with a sharp pair of kitchen scissors. Some microgreens – like pea shoots – may regrow, particularly if you chop them just above the lowest leaf.

Beginners guide to plant nutrition

February 6, 2018

https://www.nickgreens.com/single-post/2018/02/05/Beginners-guide-to-plant-nutrition

The reason for releasing the beginners guide to plant nutrition is to help you from making wrong decisions in your indoor grow room. Visualize... by the end of this, plant nutrition will be much easier to understand than politics.

Introduction

Plants are able to take in essential plant nutrients through leaves, a fact known for years. Foliar fertilization has been used for years mainly with high valve crops such as vegetables and fruits. Early uses of foliar fertilization were mainly used to balance micronutrient deficiencies, such as iron deficiency with blueberries, or to boost the appearance and shelf life of foliage plants and cut flowers. Foliar applications of nutrients can balance nutrient deficiencies caused by diseases, insect damage and plants recovering from other stress conditions. Both quantity and quality of yield can be increased by foliar application of deficient nutrients, regardless of cause.

Nutrient Mobility and Foliar Fertilization

Foliar fertilization is especially important for nutrients that are poorly mobile in the plant. An endless supply of these nutrients is needed to provide that plant has sufficient nutrition for acceptable growth and yield. If the supply of these nutrients from the water or growing media is unable to keep up with demand, then new growth will suffer from nutrient deficiency. The application for moderately mobile or very mobile nutrients is also important when the crop cannot take and deliver adequate nutrients to the growing points of the plant, but mobile nutrients have the benefit of being able to taken for older plant tissue and translocated to the new growing points.

Foliar application of mobile nutrients will help prevent the depletion of older tissue by these mobile nutrients. One frustration in using foliar sprays to supply nutrients to plants, is that intake and translocation of the applied element may not be rapid enough for growing crop yields if foliar application is the major source of a nutrient. This problem is greater for macronutrients. Foliar application of plant nutrients continues to gain increasing widespread acceptance. The mobility of nutrients generally is classified into three categories of mobility: very mobile, moderately mobile and poor or slightly mobile.

Nitrogen (N)

Nitrogen is a very mobile element within the plant, and foliar sprays using urea, nitrate salt and ammonium have been used to supplement the nitrogen levels in plants.

Urea

Urea is the most effective form of foliar nitrogen followed next by ammonium ion and then by nitrate ion. Urea is easiest to traverse the cutin layer to enter the plant, and is considered the most suitable form of N for foliar application because of its non polarity, rapid intake, low phytotoxicity and high solubility.

Ammonium

Ammonium application effectively boosts growth and yield for many crops through foliar application. Like urea, the plant assimilates most of the ammonium within 48 hours after

application. Ammonium, once inside the plant cell has a similar effect on plant nitrogen, as does urea.

Nitrate

Nitrate, through adsorbed by the plant effectively, is less effective as a foliar source of nitrogen than urea or ammonium because it must first be convert into ammonium through nitrate reduction.

Phosphorus (P)

Phosphorus is a very mobile element within a plant and its application through foliar application is an effective means of supplying phosphorus. Phosphorus foliar application can increase the concentration of phosphorus in the foliage and is more effective method of delivering phosphorus to the plant via water.

Potassium (K)

Potassium is a very mobile element, and applications as foliar sprays utilize potassium polyphosphate, potassium sulfate, potassium nitrate, potassium thiosulfate, or potassium hydroxide. Many of these sources have low salt index, are highly soluble, and can provide potassium to plants in situations where a deficiency of this element will reduce yield or is needed for foliar plants going to market.

Understanding water pH in hydroponics

February 1, 2018

https://www.nickgreens.com/single-post/2018/01/28/Understanding-water-pH-in-hydroponics

It's a hot summer afternoon and you decide to water your plants because they're wilted. You ask yourself a question, why do they keep dying? pH measures acidity or alkalinity which you must understand in order to grow a healthy plant. If you were gardening on a hot day maybe your water supply isn't great. That's another story.

Introduction

Why is pH important? If the pH of a solution is not within the correct range, the plant will not have the ability to absorb some of the essential elements required for proper plant growth. All plants have a particular pH range, which will produce healthy growth, and this level will vary from plant to plant, but most plants prefer a slightly acidic growing environment (5.8 to 6.2). Most plants can survive in an environment with pH values between 5.0 and 7.0.

Plants grown in acidic environments can experience a variety of symptoms, including aluminium (Al), hydrogen (H), and/or manganese (Mn) toxicity, as well as nutrient deficiencies of calcium (Ca) and magnesium (Mg).

Conversely, in alkaline environments molybdenum (Mo) and macronutrients (except for phosphorus) availability increases, but phosphorus (P), iron (Fe), manganese (Mn), zinc (Zn), copper (Cu) and cobalt (Co) levels are reduced, and may adversely affect plant growth.

From the chart you can see that each element can become more and less available to the plants as pH changes. If the pH of your solution is out of the desired range, one or more of the essential elements will become unavailable to the plant, causing nutrient deficiencies, which will result in slow growth rates, and poor yields.

pH Control

Chemical reactions can be inhibited or promoted by the concentration of hydrogen ions in a mixture. We can measure this on a pH scale. Industrial acidic substances are 2.0 pH - lemon, 5.0 pH - coffee, 7.0 pH - milk, 9 pH - baking soda, and 12+ pH - lye. Almost anything that contains hydrogen ions or lack of them can therefore produce a pH. As your plant grows through its life cycle, it absorbs minerals from the water and deposits waste materials of its own. The removal

of nutrients and addition of waste material can cause water pH levels to fluctuate, so in order to allow for normal course of chemical reactions to take place we need to maintain a desirable pH level. If we don't, we can experience nutrient lockout.

Water pH

Water also has a pH so remember to check your water source. For example: Your medium is 6.0 pH but you want it to be at 7. You mix a+1 pH and then add it hoping for a 6+1=7. However you forgot that the water you diluted with wasn't pH measured so you don't know if you achieved 7 or not until you measure it. Measure your water and your medium to figure out exactly what pH you need. Here's an example: Water is 5 and medium pH is 4. You would need +2 to make it 7. Then you need +3 for the medium to make it 7. What actually happens with pH-up and down is somewhat like this but the way you adjust it, by adding a little pH and testing and repeating the procedure, keeping in mind what your water's pH is. You can always use the pH-up and -down buffering solutions to find pH stability.

pH- Getting back to neutral from acidic

If your soil's pH is too acidic you will want to bring it back to a neutral 7. You can do this using lime(alkaline calcium oxide), a brittle white caustic solid obtained by heating limestone. You can find lime in containers, at your grow shop and add it to your soil. Growers know by trial and error how much lime they need to use to push acidic soil back to a pH level of 7. Not all limes work well so be sure to get the gardening lime.

pH- bringing back to neutral from alkaline

If the pH of your soil is too alkaline then you can bring it back to a neutral 7 by adding small amounts of any of the following. Moreover, most growers find a pH-down product more functional.

- Liquid humic acid
- Cottonseed meal
- Lemon peels
- Coffee Grounds
- High-acidity fertilizer

These are acidic. Always introduce small amounts of the substance, while checking the pH level the next day and readjusting as necessary. Make sure to protect your eyes and skin; you will need to wash them if you come in contact with the pH buffers.

Other pH problems

pH is important because low or high pH levels can cause nutrient lockout. pH irregularities can also cause growth stunting, leaf spots and wilting. Always check the pH level of your soil before

treating a nutrient problem. pH is an essential part of growing that you must understand to have harmony with your plants. Thanks for reading.

Understanding humidity and temperature

December 5, 2017

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		Relative Humidity													
°C	°F	100%	95%	90%	85%	80%	75%	70%	65%	60%	55%	50%	45%	40%	35%
15	59	0.0	0.8	1.7	2.5	3.4	4.2	5.1	5.9	6.8	7.6	8.5	9.4	10.2	11.1
16	60.8	0.0	0.9	1.8	2.8	3.7	4.6	5.5	6.4	7.3	8.2	9.1	10.0	10.9	11.8
17	62.6	0.0	1.0	2.0	2.9	3.9	4.9	5.8	6.8	7.8	8.8	9.7	10.6	11.6	12.6
18	64.4	0.0	1.0	2.0	3.1	4.1	5.1	6.2	7.2	8.2	9.3	10.3	11.3	12.4	13.4
19	66.2	0.0	1.1	2.2	3.3	4.4	5.5	6.6	7.7	8.8	9.9	11.0	12.1	13.2	14.3
20	68	0.0	1.2	2.4	3.5	4.7	5.9	7.0	8.2	9.4	10.6	11.7	12.8	14.0	15.2
21	69.8	0.0	1.2	2.4	3.7	4.9	6.2	7.4	8.6	9.9	11.1	12.4	13.7	14.9	16.1
22	71.6	0.0	1.3	2.6	3.9	5.3	6.6	7.9	9.2	10.5	11.9	13.2	14.5	15.8	17.2
23	73.4	0.0	1.4	2.8	4.2	5.6	7.0	8.5	9.9	11.3	12.7	14.1	15.4	16.8	18.2
24	75.2	0.0	1.5	3.0	4.5	5.9	7.4	8.9	10.4	11.9	13.4	14.9	16.4	17.9	19.4
25	77	0.0	1.6	3.2	4.8	6.4	8.0	9.5	11.1	12.7	14.3	15.9	17.4	19.0	20.5
26	78.8	0.0	1.7	3.4	5.1	6.7	8.4	10.1	11.8	13.4	15.1	16.8	18.4	20.1	21.8
27	80.6	0.0	1.8	3.5	5.3	7.1	8.9	10.7	12.4	14.2	16.0	17.8	19.6	21.3	23.1
28	82.4	0.0	1.9	3.8	5.7	7.6	9.5	11.4	13.3	15.1	17.0	18.9	20.7	22.6	24.5
29	84.2	0.0	2.0	4.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.1	24.1	26.1
30	86	0.0	2.1	4.2	6.4	8.5	10.6	12.7	14.8	17.0	19.1	21.2	23.3	25.4	27.5
31	87.8	0.0	2.2	4.5	6.7	9.0	11.2	13.4	15.7	17.9	20.2	22.4	24.6	26.9	29.1
32	89.6	0.0	2.4	4.7	7.1	9.5	11.9	14.2	16.6	19.0	21.3	23.7	26.1	28.4	30.8
33	91.4	0.0	2.5	5.0	7.5	10.0	12.5	15.0	17.6	20.1	22.6	25.1	27.6	30.1	32.6
34	93.2	0.0	2.7	5.3	8.0	10.6	13.3	15.9	18.6	21.2	23.9	26.5	29.2	31.8	34.5
35	95	0.0	2.8	5.6	8.4	11.2	14.0	16.8	19.6	22.4	25.2	28.0	30.8	33.61	36.4

Want to maximize your knowledge on humidity and temperature? Here are six points you should be concerned with.

In order to maintain the A1 environment for plants to grow in a controlled setting with artificial lighting, it is essential for you to understand the nature of the environmental influences and how to measure and evaluate them. We'll be describing the physical and chemical resources of the following environmental components and their calculations: humidity, temperature, CO2 concentration, air flow rates and number of air exchanges per hour. In addition, the basic concepts of energy balance, radiation, heat conduction and convection are outline in detail.

Temperature, Energy, and Heat

Temperature is an indicator of the realistic heat energy content of an object or a substance. Many plants physiological processes are affected by plant temperature, which is controlled by the transfer of heat between plant tissues and the surrounding environment. That being so,

monitoring and controlling the air temperature is critical for managing plant physiological activity and response. In a indoor environment, air temperature is often controlled at a comparatively constant level, resulting in constant plant temperature and, as a result, consistent physiological activity.

Energy Balance

Any object with a temperature above 0 K (absolute zero) emits thermal radiation, including the plants themselves and their environment. Energy received by plants includes absorbed radiant energy from lights and the absorbed infrared irradiation from the environment. Energy leaving microgreens includes energy lost through emitting infrared radiation, heat convection, heat condition and heat loss thru evaporation. The heat from conduction and convection, is referred to as sensible heat. That connected with the evaporation or condensation of water produces latent heat.

Microgreens leaves have high absorption in the photosynthesically activity radiation (400 to 700 nm), but the chemical energy fixed by photosynthesis is inconsequentially miniscule, compared to the total energy of the plant. Leaves of nearly all species have a low absorption in the close by infrared scale (700 to 1500 nm) because those wavelengths are transferred through or reflected from the leaf. In difference, absorption is high (roughly 95%) in the far infrared waveband (1500 to 30,000 nm), that can contribute notably to the thermal energy load on the plant.

Radiation

Radiation in the far infrared wavebands is essentially blackbody radiation discharged by environment objects. Objects of higher temperature discharge larger quantities of far infrared radiation than objects at a lower temperature. The main source of radiation energy in indoor environments are lights and reflectors. Conventional lights for indoor grow rooms and greenhouses, such as high pressure sodium lights and metal halide lights, have exterior temperatures of over 212ºF and emit large amounts of far infrared radiation.

This radiation is absorbed by plants, causing increased plant temperature regardless of environment air temperature, through hindering control over plant physiological activity. In indoor environment, this challenge is compounded by the small interval between lights and plants that is advantageous for maximizing space use efficiency and plant productivity. So, it is preferable to use light sources that emit much less far infrared radiation, such as LEDs (30ºC/86ºF) and fluorescent lights (40ºC/104º).

Heat Conduction and Convection

Energy is manage between a plant and its environment at the molecular level. Energy is transferred by conduction from the leaf cells to the air molecules in contact with the leaf. Conductive heat moves the interface between leaf and air is restricted without

convective motion due to the low thermal conductivity of air. Conductive heat interchange can also happen between plant parts and other solid or liquid media.

However, the impact of this conductive heat interchange on the plant's energy blueprint is small, because plants do not have physical contact with solid objects or liquid media. Controlling leaf and air temperatures evenly at every growing level is important in indoor grow rooms. If air circulation in a grow room is inadequate, air temperatures at the higher growing levels will be warmer than lower levels, causing the leaves in the higher canopy to also be warmer. By providing air movement in the whole grow room, the vertical air and leaf temperature inclines can be minimized, as well as differences within each horizontal canopy.

Humidity

Water vapor is the gases state of water and humidity is a measure of its content in the air. The amount of climatic water vapor can range from nearly zero up to 4% of the total mass of air. Absolute humidity, or humidity ratio, is a measure of the real water vapor content in the air and is communicated as the ratio of mass of water vapor to the mass of dry air for a defined volume of air. The air can hold on to more water vapor at higher temperatures than at lower temperatures. Relative humidity is temperature dependent and used to communicate the water vapor content of air found on the maximum amount of water the air can hold for a given temperature and pressure. It is almost all expressed as a percentage or ratio of the given water vapor content to the maximum at a given temperature. As a blueprint, if the air temperature become less with no change in water vapor content, the maximum water holding volume of the air drops, resulting in a higher relative humidity.

Water vapor is produced by evaporation from open water surfaces and evaporation from wet surfaces such as soil and plants. In a indoor environment, plants are constantly adding water vapor to the air through transpiration, which is the evaporation of water from plant surfaces to the environment. Well, actively growing plants can transpire a large amount of water, resulting in a rapid increase in water vapor. When the air conditioning system is operating, humidity is kept under control because water vapor condenses on the cooling coils, dropping the moisture content, and thus, the humidity of the air.

For that reason, one approach to controlling humidity in a indoor environment, is to alternate the functioning of the lights, which generate heat and cause the air conditioner to run. Thus resulting in concurrent cooling and dehumidification of the grow room. Dehumidifiers can be installed in the indoor environment and do not rely on the operation of air conditioners. These units may be used in indoor environment. Applications that require day/night cycles, when turning on the lights for dehumidification would be undesirable. They can also be used to avoid operating lights and air conditioners during peak hours use.

Vapor Pressure Deficit (VPD)

Relative humidity is commonly used as a measure of air humidity, it supplies no direct information about the driving force of transpiration and evaporation. Instead, the vapor pressure deficit (VPD) is a measure of the driving force, meaning that transpiration and evaporation rates are proportional to VPD. VPD is the difference (deficit) between the amount of moisture in the air and how much moisture it can hold when it is saturated at the same air temperature and is expressed in units of pressure.

While water vapor content increases, water molecules apply more force on each other, resulting in a higher vapor pressure. Because air can hold more water vapor at higher temperatures, the maximum water vapor pressure is higher at higher temperatures. When the VPD is too low, transpiration will be reserved and can lead condensation on leaves and surfaces inside the indoor environment. Also, when the VPD is high, the plant will draw more water from its roosting an effort to avoid wilting. If the VPD gets too high, plants close stomata and shut down the transpiration altogether in an effort to prevent excessive water loss. In indoor environment, the idea range for VPD is from 0.8 kPa to 0.95 kPa, with an optimal setting of around 0.85 kPa.

CO2 Concentration

CO2 is a naturing occurring chemical compound. It is a linear covalent molecule and is an acidic oxide, and reacts with water to give carbonic acid. CO2 is a nonflammable, colorless, odorless gas at standard temperature and pressure and exists in earth's atmosphere at this state as a trace gas. Atmospheric CO2 concentration varies with time of day and location depending on adsorption and respiration of plants and animals, and human activity. CO2 is produced from the combustion of coal or hydrocarbons, the fermentation of liquids, and the respiration of humans, animals, and fungi.

Air Current Speed

There are often two confused definitions regarding current. *Air current speed* is defined as distance air travels over a specified period of time, such as one meter per second. *Air velocity* is the term used when the direction of air current speed is specified. Inadequate air current speed around plants suppresses gas diffusion in the leaf boundary layer, which later on reduces rates photosynthesis and transpiration and hence, plant growth. Maintaining suitable air speeds indoor environment creates small turbulent eddies around the leaf surface that facilitates gas exchange between the plants and the surrounding environment, promoting plant growth.

Low air speeds can cause variations in air temperature, CO2 concentration, and humidity inside the plant canopy. This results in inconsistent growth on leaves and other surfaces in the grow room, helping to prevent unwanted growth of bacteria and molds. Fans can be used to circulate air movement and control air speed within the plant canopy in the grow room. To achieve exact

air speed control, special calculation, design master plans regarding the location, number, and capacity of fans are required when a indoor grow room is built.

Number of Air Exchange Per Hour

Number of air exchange per hour is a measure of how many times the air within a defined space is replaced by new air, which is defined as the ratio of hourly ventilation rate divided by volume of room air. If possible, the number should be small for the purpose of controlling the environment and preventing entry of pathogens and pest. But, a minimum air exchange rate should be maintained to prevent the accumulation of ethylene in a indoor grow room, which can cause damage to the plants.

Quick guide on grow lights

December 12, 2017

https://www.nickgreens.com/single-post/2017/12/05/Quick-guide-on-grow-lights

Everyone agrees that knowing how to grow food indoors with grow lights is valuable. It improves your health, brightens your day, calms your nerves, and allows you to do more with your existence.

Grow lights are the most important environmental element affecting plant growth and development, because selection of grow lights can have a remarkable effect on the costs, operational costs, and quality of plants in your indoor grow room. Light sources often used in indoor grow rooms are introduced with a simple clarification of the fundamentals necessary to understand the grow lights. Particular importance is placed on LEDs, which have received extraordinary awareness recently, and on florescent lights, which are still commonly used in indoor grow room.

Physical Properties

Light is electromagnetic energy, which is also explained as electromagnetic radiation comprise both visible and invisible wavelengths. The smaller the wavelength, the greater the energy. The wavelength of visible light ranges from 380 to 780 nm, which is what people eyes see.

Visible light is key to plants because it occurs simultaneously with photosynthetically active radiation (PAR, 400-700 nm). For solar radiation, 97% is inside the 280-2800 nm range. In this regard, 43% is visible light, which is practical for plant growth, 4% is ultraviolet, and 53% is infrared, which makes heat. Only electric lights are used in indoor grow rooms. Light has two opposed properties: it can be noticed as a wave phenomenon, and it also acts as separate particles called *photons*. A *photon* is the smallest particle of light, or a single quantum of light.

Light varies in at least three dimensions: quantity, quality, and duration. When electric lights are used in a indoor grow room, the lighting cycle, which affects plant growth and development, can be willingly changed. Light effects plants in two ways: providing energy or a quantum source and acting as an information medium. While an energy source, the photons of light, are caught by plants and a part (up to 10%) of photons are caught by plants and converted to chemical energy (carbohydrates) through photosynthesis. Almost all of the light energy or photons caught by plants are converted into heat energy.

Light Sources

Till recently, most of the light sources used for indoor grow rooms were fluorescent lights and high intensity discharge (HID) lights. Till just a decade ago, LEDs were used almost exclusively for research on plant cultivation, but are now being used as a light source for commercial plant cultivation in indoor grow rooms because of their fast price decline and quick improvement in luminous efficacy, which is a measure of how efficiently an electrical lamp produces visible light.

LEDs

LEDs offer advantages over fluorescent and HPS lights: they are strong, produce a stable output, are long lived, compact, and lightweight. They also turn on right away and allow the light output to be easily controlled with a light source consist of several color types of LEDs. The benefit of using LEDs as a light source for indoor grow rooms, is that LEDs offer great flexibilty. They can make various light environments compared to conventional lights. A light source having a few types of LEDs with different peak wavelengths can produce light of which the spectral radiant inconstancy can be varied with time. The biggest disadvantage of using LEDs for indoor grow rooms is the high beginning cost for a set of LED lights, compared to conventional lights.

Fluorescent Lights

Fluorescent lights offer no direct advantage over other lights including LEDs. Tubular fluorescent lights are the most suitable light source at present for indoor grow room when taking into account all the factors of bulb and luminaire prices, rated life, luminous efficacy, ready availability, and lighted bulb temperature. A tubular fluorescent light normally consist of a glass tube coated inside with a fluorescent material (phosphor), two tungsten electrodes at the two inside ends that are coated with an electron emissive material, a tiny amount of mercury, and low vapor pressure insert gas (mainly argon) enclosed in the glass.

High Intensity Discharge (HID)

HIDs are a type of electrical gas discharge light, which generates light by means of an electric arc between tungsten electrodes sheltered inside a translucent or transparent fused quartz or fused alumina arc tube. HID lights make more visible light per unit of electric power adsorbed than fluorescent lights, since a larger proportion of their radiation is visible light in contrast to infrared. Yet, the lumen output of HID lighting can lower by up to 70% over 10,000 burning hours.

How to choose the right grow media for microgreens

March 28, 2017

https://www.nickgreens.com/single-post/2017/03/28/How-to-choose-the-right-grow-media

While most of us know the best way to grow microgreens is in a 10X20 tray, The big question is: what do I line the tray with? And, like everything else in agriculture, the answer is... Well, it depends.

Here are a few of the more popular grow media substrates for microgreens are:

Soil -Although messy, soil produces the best yields and product. We like Sunshine #4 by Sunshine Aggregate the best and Happy Frog by Smart Naturals is a close second. These are the most sterile soils on the market and ideal for indoor growing. The coolest part about these soils is no nutes needed. Only water and PH down with a splash of fulvic acid diluted at the following rate (.25 ml / 4 litres). Fill up your 10X20 tray about 1" thick. Although ideal for growing all varieties, it makes a big difference for colorful varieties like Amaranth and Bulls Blood. Good soil isn't cheap, expect to spend around $1.00 per tray for either of the soil mixes recommended. With a good compost and sterilization program, your soil can be reused, which will drive the cost per tray down to competitive levels.

Burlap - At .25 per tray, this is the most economical alternative, but also the most unforgiving which can lead to inconsistent harvests. With perfect conditions, 72 F and 50% humidity, and a good fertigation plan (fertilizer + irrigation) a grower can achieve yields and results with burlap that are similar to soil mixes. However, there is a lot of execution risk with this substrate and your overall average yields will suffer as a result. Varieties with large seeds like Pea Shoots or Wheat Grass grow beautifully on burlap yielding ~12 ounces per pad in a wide range of environmental conditions.

Coco Coir -We like the Roots Organic compressed Coco Fiber. The Coco stays moist and due to its consistency you can't really over water it. Coir is less expensive than soil but just as messy. We found that coir can increase yield nearly 25% to 35% over burlap, but it is nearly 2.5X the price at .60 per tray. Coir is excellent with ebb-flood systems.

Jute Pads - The Jute Pads holds water really well which decreases the amount of feedings per day. All microgreen varieties grow really well in Jute, especially Kale, Broccoli, and Cabbage.

***BioStrate* by Grow-Tech**- We have had trouble growing with biostrate because it does not absorb water properly, drying too quickly. We also have had issues figuring out what it was made of. At .86 per tray, it was difficult to grow profitably.

*To help make your decision about media, answer the following questions.

1) How will I feed by my plants? For hand watering operations, soil and coir are the best choices. If you have the ability to feed on a timer, burlap might be a better option due its low cost.

2) Where do I buy my seeds? We buy our seeds from Todd's Seeds - Todd's Seeds specializes in good, old-fashioned, Heirloom, non-gmo, open pollinated vegetable, flower and sprouting seeds. Johnny Selected Seeds - For more than 40 years Johnny's Selected Seeds has been helping families and friends to feed one another.

3) Do I soak my media before use? Not all media, the media that should be soaked before use is hemp mat, biostrate, and burlap. Soak with filter water for a hr or so.
4) What tools and materials are required? Bucket, Gloves, Safety goggles, Spray bottle, ph strips, chlorine test strips, This is just a basic list; depending on what media you choose, you might need other materials or equipment.

	Soil	Burlap	Coir	Biostrate	Hemp Mat	Rockwool	Vermiculite
Pricey	x	xx			x	x	x
Re-Useable	x		x				x
Compostable	x	x	x		x		x
NFT		x		x	x	x	x
Ebb-Flood			x		x	x	
Drip	x		x				x
Dutch Bucket						x	
Smart pot	x		x				

Understanding coco coir as a grow medium

January 23, 2018

https://www.nickgreens.com/single-post/2018/01/23/How-To-Grow-Microgreens-Using-Coco-Coir

I bet you are used to seeing coconuts in movies, where people sip out of them as they casually lay there taking the sun. Well, we have some news for you too. Coconuts can also be used in growing microgreens.

Introduction

Coconut coir usually comes in blocks. Adding temperate filter water to the blocks causes it to expand to produce a very refined growing medium for microgreens, that you can mix with your soil. It keeps the pH value from diving too low; Coir is also great for soil structure.

What Is Coconut Coir?

In the past, when coconuts were harvested for their delicious meat and juice, the coconut husk was considered a waste product. All of the material from the husk to the inner shell of the coconut was a discard product until people realized it had many applications in gardening and home products. Everything in between the shell and the outer coating of the coconut seed is considered coco coir. There are two types of fibers that make up coir — brown and white. Brown coir comes from mature, ripe coconuts and is a lot stronger, but less flexible. White fibers come from pre-ripe coconuts and are far more flexible, but much less strong. Most of the coconut coir used for hydroponics is brown coir, as it's processed even more after initial harvesting.

How Is Coconut Coir Made?

Before Coconut Coir is used it has through go through an extensive process before it is used. First, they remove the coir from the coconuts. How is this done? This is done by soaking

the husks in water to loosen and soften them. This is either done in tidal waters or freshwater. If done in tidal waters, the coconut coir will take up a large amount of salt. This then prompts the manufacturer to flush out at a later stage. Then, they're removed from the water bath and dried for over a year. After the drying process, which is quite extensive, the coir is organized into bales. The bales are then chopped and processed into various formats, from chips, to "croutons", to classic ground coconut coir.

Using Coconut Coir In Hydroponic Gardening

Coconut Coir makes transitioning from soil gardening to hydroponic gardening very easy as it handles just like regular potting soil. You can easily begin practicing a modified form hydroponic gardening with regular flower pots and grow lights. When searching be sure to choose the right type of coir for your purpose. You will find a variety of products packaged for garden, ornamental and hydroponic use.

Coconut coir prepared for hydroponic gardening has the sodium and potassium removed to provide a completely nutrient-neutral medium. This gives you complete control over the nutrient uptake of your plants. Extra special care is needed when preparing coir for use in hydroponics. While the ornamental variety is quite inexpensive, it is unsuitable for hydroponic and food production use because it might contain higher salt levels.

For hydroponic use, brown coir, the more processed fiber is preferable. It is more of an innate material that acts primarily as a support medium and presents less risk of introducing unwanted organisms to a hydroponic garden.
In the production process, salt is often introduced during the soaking phase. Some producers use fresh water and others use tidal waters. The salt must be rinsed out very thoroughly to produce a product appropriate for hydroponic usage.
The best quality of hydroponic grade coir, comes with a low salt content; however, never take any chances. Always flush the product with low EC nutrient solution in advance of using it in your hydroponic setup.

Rinse until the solution washes through clear (rather than brown or tan). Once you have clear water running through the product, test this water for both EC and pH before using the product. Amend and adjust as needed when supplying your setup with water.

How to grow microgreens from seed

January 9, 2018

https://www.nickgreens.com/single-post/2018/01/08/How-to-grow-microgreens-from-seed

Want to grow your own microgreens at home? Here are 12 procedures that are sure to help.

Introductions

What are microgreens, exactly? Many people think they are sprouts, but it's a different product. Others think they are baby lettuce, but that's because they haven't tried microgreens. So what are microgreens and what makes them distinctive from sprouts and baby lettuce? Microgreens are tiny seedling plants of many varieties of vegetables, herbs, lettuces, greens, and flowers, grown 7-21 days from start. These tiny young plants have flavors that range from very mild to totally intense, and people are often surprised by heavenly flavor that they can add to any dish. Specific varieties that can be grown as microgreens are large, and include mustard varieties like ruby streaks, mizuna and tatsoi, herbs like parsley and fennel, vegetables like radish, carrot and celery, even flowers like nasturtiums and marigolds.

Growing Methods

Microgreens are grown on a pad made from 100% sustainable plant fibers to hold the seeds in place and keep them from rolling around before they sprout. If you lay the pad in the 10x20 tray dry, they would not lay flat, and the seeds would go rolling off the high spots and end up crowding up the low spots. The pads would also have a hard time becoming evenly moist to begin with. Before placing the pads in the tray **PRE-SOAK THEM** in a bucket of vegan boost water. This helps them lay flat in trays, which makes planting a lot easier and helps give the seeds a germination boost. Plan to put the pads in a couple hours before you plant.

Planting and Growing Procedures

1. Pre-soak microgreens pad in vegan boost water

2. Weigh out the correct amount of seeds to be planted

3. Place seeds into a season shaker

4. Place the wet pads into the tray

5. Smooth out the pad until completely flat

6. Evenly shake the seeds in each tray, one tray at a time, using a gentle shaking motion

7. Spray each tray, one at a time, spray generously.

8. Spray humidity dome and place dome on the trays

9. Place the trays in a dark area for a couple of days

10. Day 3 take off the humidity dome and place the tray under a grow light

11. Look for the first set of "true leaves" as a sign of readiness.

12. Grab scissors and cut the microgreens just above the pad line

Product Uses

Microgreens are quite versatile, and can be used in a numbers of ways. Put them on tacos, pizza, soups, in salads, on sandwiches, anywhere you'd put baby greens or lettuce or cook them in stir fry. Use them as an amazing garnish or ingredient on any dish. They can also be eaten as a salad and added to sushi and wraps.

SIDEBAR – CHOOSING A SEED

Microgreens - It starts with a seed

May 30, 2017

https://www.nickgreens.com/single-post/2017/05/30/Microgreens---It-starts-with-a-seed

Not all seeds or seed companies are created equal. Since 2010, we purchased seeds from all the major vendors (and some of the minor ones, too) and found that quality varies greatly. For instance, you might find that kale seeds from Company A yield better than the kale seeds from Company B but Company B's arugula is better than Company A's. Further, not every seed is good to grow microgreens and you will have to run a lot of experiments to see what works (and doesn't work) in your environment. Below is our summary of the top seed companies in America, with our recommendation of our favorite seeds.

1) Johnny's Selected Seeds - Winslow, ME $$$$

They maintain an onsite seed lab, and set and maintain minimum germination requirements that consistently exceed those of the US Federal Seed Act. Overall we found this company to be expensive, but superior when it comes to customer service and on time delivery. Johnny's easily has the biggest selection of microgreen seeds.

2) Todd's Seeds - Wixom, MI $

Todd's specializes in Heirloom, non-gmo, open pollinated vegetable, flower and sprouting seeds. All seeds are inspected and packaged the old-fashioned way -- by hand. We found that this company has the highest quality bulk seeds at the lowest wholesale prices in the industry.

3) High Mowing Seed Company - Wolcott, VT $$$

If you need 100% certified organic seeds, 100% of the time, then this company is the one! Bred to perform best in organic conditions, the seeds are bred with robust, vigorous genetics and modern disease resistances. We used this company on a commercial scale when we built a certified organic program that was selling to 42 Whole Foods Market stores. Very dependable and great customer service.

4) Kitazawa Seed Company - Oakland, CA $$

This company is the oldest seed company in America. Since 1917 they have been the source for oriental vegetable seeds for home gardeners, retailers, and commercial growers. They have great prices and excellent customer services.

5) Mountain Valley Seed Company - S. Salt Lake City, UT $$$

Since 1974 they have been providing fellow passionate growers with wide range of high quality seeds at wholesale prices. This company has a great selection of microgreen seeds.

6) **Sprout People - San Francisco, CA $$**

This company specializes in sprout seeds, but these seeds can be used to grow microgreens. Perfect for the home grower that can't afford to buy bulk. A great selection at reasonable prices, since 1993.

Foolproof growing tips for microgreens

February 27, 2018

https://www.nickgreens.com/single-post/2018/02/24/Foolproof-growing-tips-for-microgreens

Ever feel like growing microgreens is a bit like being stuck in a blizzard? We promise that these foolproof tips will help you out a lot. Growing microgreens doesn't have to be brain science. It should be like strolling on a tropical island with no worry in the world. Easier said then done right? We sure wish that someone would've told us these tips when we were first attempting to harvest.

Water Quality

At the start of a microgreens crop, an hydroponic system is filled with water. Water is continually being lost from the system, mainly through the leaves of the microgreens crop by a process known as transpiration. The volume of water in the system is, however, maintained constant by the automatic replacement of the water that is lost. This is achieved by a float valve in the catchment tank, which allows water to flow into the microgreens system from an external source as required. This make up water will normally contain dissolved substances in it. The nature and quantity of the substances in solution in the water will differ with locality. If these substances are not removed from the water by the microgreens crop plants at a faster rate than they are being supplied in the make up water, then their concentration in the recirculating water in the microgreens system will increase, until a concentration of one ion will be reached at which growth is adversely affected, and eventually a toxic concentration will occur. The best water for growing microgreens is rainwater or water condensed from moisture laden air. Water from these two sources has virtually no dissolved substances in it.

Consequently, there is no build up of excess ions coming into an hydroponic installation with the make up water.

Filtration

Very little filtration should be required in an microgreens hydroponic system. If the make up water does not contain solid particles in suspension, and if the method of supporting the young microgreens plants does not release solid particles into the recirculating solution, then filtration will not be necessary. The only precaution to take would be to site the inlet of circulation pump in the catchment tank, as far as possible from any solution returning from the microgreens hydroponic system to the tank, and also near the surface of the solution in the tank. the tank will act as a sedimentation tank and the solution recirculated by the pump will thus be drawn from the clear solution near the surface. Yet, if there is a problem with solid particles in suspension, a course filter should be fitted over the outlet end of the catchment pipe so that the returning solution discharges into the tank through the filter.

Root Death

In an microgreens crop, the root system can be inspected readily. Consequently, if any roots should die. their demise is quickly seen and observed in all its tragedy. Roots are so basic. If too many roots should die, will not the whole microgreens plant die? In soil grown microgreens crop, the death of roots cannot be seen. The phenomenon of root death has been most extensively studied in tomatoes. Three english research workers at the Chestnut Experiment Station (Leonard, Head and Cooper) in the 50s, using glass sided inspection trenches dug besides rows of soil grown tomatoes, recorded the root growth visible through the glass. All three workers studied plants from December sowing dates, because at the time, most commercial tomato crops in southern England were not sown before December. They all reported a sudden and marked loss of roots in the month of May; from 50% to 90% of the roots visiblein the glass panel suddenly died and decomposed. The phenomenon was given the name of the 'May Check', because there was also a reduction in the growth rates of the tops of the plants.

Without these tips you'd possible be stuck in These tips are foolproof. If you follow these basic guidelines you can't possibly go wrong. These are the essentials needed to grow microgreens. Remember consistency is key!

Supercharge your hydroponics setup

February 16, 2018

https://www.nickgreens.com/single-post/2018/02/15/Supercharge-your-hydroponics-setup

Searching for better ways to spice up your hydroponics setup? Well have we got a secret for you. If you want to add something more to your hydroponics setup this is it. A vortex brewer will supercharge your setup and add more to what you already have. If you want to know some more about the positives a vortex brewer read below.

Why A Vortex Brewer?

The vortex brewer is a potent method of growing beneficial microbes. When added to the garden, these microbes act in synergy with growing plants.
At less than a 5 gallon volume, this is definitely not a commercial unit, but it makes the power of the vortex available to the home and hobby gardener. There are no water pumps used to accomplish the vortexial circulation in the Brewer; the movement of the water is accomplished entirely by the influx of air.

High volumes of air are pumped into the up-pipe creating a vacuum behind them as the bubbles float upwards. This action naturally pulls water from within the drum downward and back up into the up-pipe. This means that no compost tea bags ever need to be used. I settled on this design because it is affordable, easy to build, disassemble and clean. The Vortex Brewer uses the natural stimulation of the vortex rather than simple stone aeration to stimulate biological activity. The Vortex Brewer create living, organic compost tea, but it acts as an extractor, it will potentize fertilizer recipes, allow for perpetual brewing, and can stir Bio Energetic concoctions for anything from stimulating soil regeneration.

WHAT ARE COMPOST TEAS?

Compost teas, often shortened to just “tea,” are part of a new approach to plant nutrition and soil inoculation, where, rather than letting the microbial community develop by chance, growers deliberately inject preferred microbes and nutrients into their grow medium. As the name suggests, compost teas start with compost, which is an excellent source of nutrition for plants. However, the nutrition in compost is typically locked away inside large, complex organic molecules. Microbes inside compost break down the complex molecules into simpler molecules that plants can easily absorb.

Compost teas take plant nutrition a step further by nurturing microbial growth, improving the effectiveness of traditional compost. When compost teas are “brewed,” microbes are cultured in warm water with plenty of air: ideal conditions for growth and propagation. These microbes form symbioses with the plants, making them more vigorous, healthy, and resilient to stress, resulting in bigger, better yields.

The Benefits Of Compost Tea

Better plant growth in the form of better tasting vegetables, bigger blossoms and greener leaves.

A boost of beneficial organisms that enhance the immune system of plants.

Plenty of nutrients for the plants that are easily absorbed straight through the plant roots.

Encourages the growth of root systems to help your plant pull nutrients from farther down.

Provides an all-natural alternative to harsh chemical composts that cause harm to native plants, insects, wildlife, and even humans.

A vortex brewer is an essential part of growing because it gives you a boost. Sometimes we need a little boost to help us grow better.

Key health benefits of microgreens

February 9, 2018

https://www.nickgreens.com/single-post/2018/02/08/Key-health-benefits-of-microgreens

Have you ever been curious as to whether Microgreens pack a punch of nutrients? The answer: yes. Microgreens, have been around for a while. They were mostly used for garnishing but we are now starting to know that they might be a lot more nutritious than normally grown vegetables. We'll be going into detail on the benefits of Microgreens.

What Are Microgreens

Microgreens is the universal name for almost any green vegetable or herb that has edible leaves and is harvested at the cotyledon growth stage –the stage when the first set of true leaves sprout. The cotyledon growth stage comes after the germination and sprouting stages but before a plant fully develops its root and leaf structures. The first set of true leaves develops after the cotyledon -- or the first two visible leaves -- of a plant appear. When the next set of leaves -- anywhere between two to four -- are produced, the plant actually enters the cotyledon stage. If the plant is allowed to grow, it becomes a seedling.

Microgreens Are Nutritious

According to Gene Lester in an interview with NPR, "He was knocked over," at the fact that microgreens had a lot more nutrients than expected. Lester then continued, "The researchers looked at four groups of vitamins and other phytochemicals – including vitamin C, vitamin E, and beta carotene — in 25 varieties of microgreens." They went on to discover that these microgreens were loaded with nutritious value.

Studies, have presented that microgreens are loaded with nutrients, such vitamins, C, E, and K, lutein, and beta-carotene, 40 fold than the mature leaves of the same plants.
Like the full-grown counterparts, the levels of these nutrients vary across the wide array of microgreens.

A US study looked at nutrient levels of 25 different microgreens and compared them to published information on full-sized leafy vegetables and herbs.

Nutrient levels in different microgreens varied. But they typically had higher levels per gram of vitamin C, vitamin E and carotenoids (plant compounds, some used to make vitamin A and others help maintain eye health) than mature crops.

Microgreens Types

Microgreens are most commonly harvested from leafy greens such as kale, arugula, beet greens, onions, radish greens, watercress, chard and pak choi and herbs such as cilantro, basil, chervil, parsley and chives. The taste of microgreens depends on the original vegetable. Microgreens have a very strong and concentrated taste of the original vegetable. This means that cilantro microgreens will still taste of cilantro but in a stronger, more vegetable and condensed format.

Microgreens aren't going to replace mature vegetables anytime soon but they will make their name known because they're just as great! They add nutritional value and they also add complex flavors to dishes or salads.

How to use microgreens

February 13, 2018

You’re on a Valentine's date, order a heart shaped pizza with veggies because your date enjoys the occasional basil or arugula on their pizza. Let’s say you order and expect the normal piece of grown parsley fusing with the cheese…You realize this is not the case while you receive the pizza. You find tiny leaves fusing with the succulent melting cheese. You take your first bite: Heaven. It not only taste good but microgreens look extremely cute. This is your entrance to the world of microgreens! After this you become inspired to grow and use them in more of your everyday foods that you prepare at home. Microgreens will do that to you. Impress you more than your date.

Product Uses

Tasty little morsels that they are, microgreens are quite versatile, and can be used in a number of ways. Put them on sandwiches, in salads, on tacos, pizza, soups, anywhere you’d put lettuce or sprouts or cooked them in stir fry. Use them as an eye-catching garnish or ingredient on virtually any dish, meat and fish included. They are generally intended to be used fresh and raw. They make an excellent salad main ingredient, too....just toss with a balsamic vinaigrette dressing and perhaps a little tomato. Voila! A taste sensation that will have you coming back for more!

Microgreens on Sandwiches

Many people are unsure on how to use microgreens. Sandwiches can be fat and heavy. Microgreens pack a punch of light flavor and freshness, weighing out earthier flavor's and providing added nutritional value. Using microgreens in sandwiches can also provide a blessing through an added crunch of texture. Switch up the variety of microgreens depending on the ingredients of the sandwich to take your sandwich to the next level.

Microgreens in Salads

Microgreens salads are both tasty and nutritious. Because different microgreens varieties hold such different flavor profiles, they can be combined to build salads with a light and spicy flavor,

or hit the taste buds with a punch of sweet or mild, it's up to you. Microgreens can also be a fantastic addition to a typical leafy greens salad. Add a punch of flavor and nutrition to your salads with a spicy microgreens like red ruby streak mustard.

Microgreens in Nutritional Shakes

Having a clam shell of microgreens that you can grab and use in nutritional shakes every morning or throughout the day can help you live a happier lifestyle, if that's what you are pursuing. Some microgreens varieties have proven to pack up to 40 times the nutritional value versus mature plants.

Other Uses For Microgreens

Microgreens are often used in Wraps, Sushi, Stir fry's, Soups, Tacos and in meat dishes. Microgreens are versatile and flavorful and can compliment in any dish. And yes, they make powerful and delicious garnishes, but they are more than just garnishes.

You should always stay curious and adventurous while cooking or growing microgreens. Remember microgreens are a lifestyle – a fruitful journey.

Microgreens Recipe

Author: Malibu Kitchen
Recipe type: Breakfast
Cuisine: Gluten-free, Detox, Vegetarian
Serves: 2

Ingredients

2 slices multi-grain or gluten free bread, toasted
1 ripe organic avocado, pitted, peeled, and sliced
1/4 lemon, cut into wedges
Kosher salt and freshly ground black pepper
1/2 cup Asian micro mix or other microgreens
1/4 teaspoon toasted sesame oil
1 teaspoon sesame seeds, toasted

Instructions

Divide avocado slices evenly and place on top of toast slices. Using a butter knife, carefully smash avocado slices. Squeeze lemon slices over avocado, sprinkle with salt and pepper, top with microgreens, drizzle with sesame oil, then complete with a sprinkling of sesame seeds.

Nutrition Information

Serving size:2 Calories:253 **Fat:16 g** Protein:4 g **Cholesterol:0**