Volume 2024 Number 47 MICROGREENS WORLD Monday December 30 2024

WEEKLY DIGEST

SULFORAPHANE: GETTING THE MOST FROM YOUR BROCCOLI MICROGREENS, WITH NEW RESEARCH

CHEMOPROTECTION: IN 1992, DR. PAUL TALALAY`S RESEARCH AT JOHN HOPKINS UNIVERSITY SHOWED WHY BROCCOLI MICROGREENS ARE GOOD FOR US.

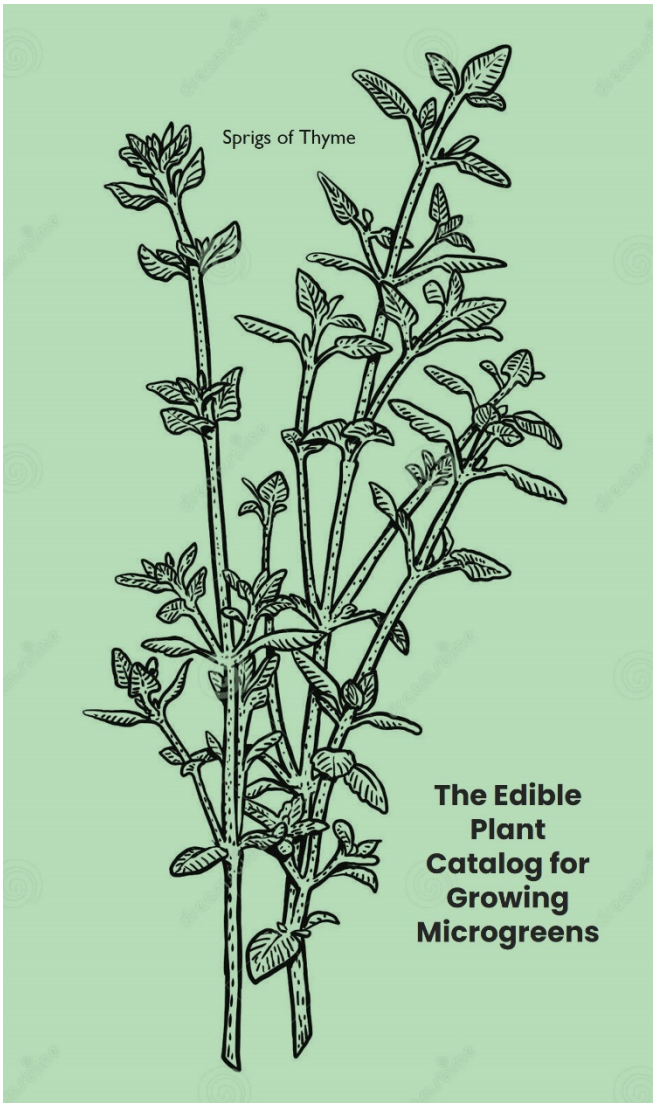
CREATIVE RECIPES: Brassica-Powered Cod with Triple Microgreens
COMMERCIAL BEST PRACTICES: Hemp Microgreens: Nutrient-Powered Health
CULTIVATION TECHNIQUES: Yield Boost for Healthier Microgreen Varieties

"Delivered to Your Inbox Every Monday," your summary digest of the latest microgreens, urban, vertical farming, and new trends and exciting startup stories from around the world.

Sulforaphane: Getting the Most From Your Broccoli Microgreens With New Research

Vol. 2024 No. 47 Monday, December 30, 2024

The Edible Plant Catalog for Growing Microgreens



Discover a wealth of possibilities in microgreen cultivation with our meticulously curated guide featuring **over 200 edible plant species**.

Each entry outlines specific growing requirements to jumpstart your microgreens growing journey, offering insights into optimal light, temperature, and watering conditions.

This invaluable resource caters to commercial growers, researchers, and home gardeners seeking to broaden their horizons beyond traditional crops.

Embrace this opportunity to innovate and contribute to the expanding field of microgreens, enhancing your expertise while enjoying the unique flavors and nutritional benefits of diverse plant varieties.

LEARN MORE

Nutrition Science

Chemoprotection: Broccoli Microgreens, Diet, and Disease Prevention

Dr. Paul Talalay's research at Johns Hopkins University showed why broccoli microgreens are good for us.

Dr. Paul Talalay was a researcher at Johns Hopkins University who dedicated his career to understanding how diet can prevent disease, particularly cancer.

Talalay's research led to the discovery of sulforaphane, a compound found in cruciferous vegetables like broccoli, that boosts the body's natural defense mechanisms against cancer.

This discovery has significantly impacted both scientific research and public awareness of the importance of diet in health.

Talalay's journey began with a fascination with enzymes and cancer. He was inspired by the work of Charles Huggins, who developed hormonal treatments for prostate cancer, which led Talalay to focus on anti-tumor agents.

He established the pharmacology PhD program at Johns Hopkins and recruited top researchers. Talalay's career took a significant turn when he shifted his focus from cancer treatment to cancer prevention. This was a controversial move at the time, as many believed that cancer was not a preventable disease.

Talalay's research on chemoprotection, which

SUMMARY

This article from *Johns Hopkins Magazine* profiles Paul Talalay, the researcher whose six-decade career focused on chemoprotection—**the study of substances, primarily from plants, that enhance the body's disease-fighting capabilities**.

His discovery of **sulforaphane** in broccoli, a potent cancer-fighting compound, significantly impacted public health awareness and broccoli sales.

The article highlights Talalay's pioneering work, his establishment of a new Chemoprotection Center at Johns Hopkins, and his advocacy for diverse diets over supplements in disease prevention.

Despite initial skepticism from the medical community regarding preventative measures, Talalay's research significantly advanced the field, demonstrating the potential of plant-based compounds in combating various diseases.

He emphasizes the importance of a varied diet rather than relying on isolated supplements for optimal health benefits.

seeks to identify substances that can enhance the body's ability to fight disease, led to the identification of sulforaphane.

He found that sulforaphane, especially abundant in broccoli microgreens, can upregulate the functions of human proteins that neutralize disease-causing processes. This discovery, though initially met with skepticism, sparked a surge in research on the disease-fighting power of sulforaphane.

Talalay and his team formed Brassica Products to sell broccoli microgreens with high concentrations of sulforaphane, further demonstrating the practical applications of his research.

The article highlights the development of a topical extract of broccoli by Talalay's lab, which can protect skin cells from sun damage. It also touches on Talalay's personal life, which includes a love of learning. He came to the US from England after fleeing Germany as a child. Talalay's career has been marked by his willingness to explore unconventional ideas, tackle new areas of research, and challenge established norms.

Despite the success of sulforaphane, Talalay emphasizes that it is the

principle of chemoprotection itself that is most important.

He underscores the importance of a varied diet, rich in fruits and vegetables, to get the most health benefits, rather than relying on supplements.

> He is critical of the supplement industry, stating that there is little evidence to suggest that supplements provide the same benefit as a varied diet.

The article concludes by describing the establishment of the new Chemoprotection Center at Johns Hopkins, designed to promote interdisciplinary research into disease prevention.

Talalay envisions the center as a hub for discovering food-based substances that can help people suffering from a range of chronic conditions, including Alzheimer's disease and cardiac problems.

He hopes this center will provide concrete evidence of how diet can prolong life. The center will incorporate plant physiology, animal studies, and clinical trials. The center reflects Talalay's dedication to moving beyond disease-specific approaches and exploring common stressors across various illnesses.

The article emphasizes Talalay's innovative approach to research and his desire to apply his discoveries to improve human health.

His work challenges the medical community's focus on treatment and promotes the critical role of diet in disease prevention.

Source: Anft, M. (2008, April). A nibble of prevention. Johns Hopkins Magazine. https://hub.jhu.edu/2008/04/01/nibble-prevention/

Creative Recipes

Brassica-Powered Cod with Triple Microgreens and Quick-Pickled Daikon

A celebration of cruciferous vegetables meets delicate cod, creating a dish that's both nurturing and sophisticated. The interplay of raw and barely wilted microgreens maximizes their sulforaphane content. At the same time, mustard powder acts as a natural catalyst for nutrient absorption.

Recipe Information

- *Prep Time*: 15 minutes (including "chop and wait")
- *Cook Time*: 12 minutes
- *Category*: Main Course
- *Method*: Pan-seared
- *Cuisine*: Mediterranean-Asian Fusion
- *Yield*: 2 servings

Ingredients

For the Fish:

- 2 cod fillets (6 oz each), patted dry
- 1 tbsp olive oil
- 2 cloves garlic, minced
- ½ tsp mustard powder
- Sea salt and freshly ground black pepper

For the Microgreens:

- 1 oz broccoli microgreens
- 1 oz radish microgreens
- ½ oz watercress microgreens
- 1 lemon
- Flaky sea salt for finishing

Quick-Pickled Daikon:

- 1 small daikon radish, thinly sliced
- ¼ cup rice vinegar
- 1 tsp honey

- Pinch of salt

Preparation

1. Start with daikon: Combine vinegar, honey, and salt. Add daikon slices and set aside.
2. Chop microgreens and let rest for 2 minutes to activate enzymes
3. Season cod with salt and pepper
4. Heat oil in a pan over medium-high heat
5. Sear cod for 4-5 minutes per side
6. Remove cod, reduce heat
7. Sauté garlic with mustard powder for 30 seconds
8. Briefly wilt half the microgreens for 20 seconds

Plating

Layer pickled daikon on plates. Place cod atop. Crown with wilted microgreens and scatter fresh ones around. Finish with lemon juice and flaky salt.

Health Benefits

This combination of brassicas provides synergistic compounds

that help regulate blood sugar and improve insulin sensitivity.

The addition of mustard powder enhances sulforaphane conversion. At the same time, the quick-pickled daikon supports gut health - both crucial for diabetes management.

Community News

Growing Greens: Student Turns Project into Passion

The article discusses the journey of Shakti Kumaran Selvakumaran, a Business Administration student at Singapore Polytechnic, who transformed a school project on microgreens into a business venture called Micro Munch.

Microgreens, known for being highly nutritious, are small, young vegetable greens that can be grown indoors.

Kumaran offers **grow-it-yourself kits featuring broccoli, beetroot, and red radish for $6.90**, aiming to make microgreens accessible and affordable for all, not just luxury items in restaurants.

The process of growing them is simple and requires watering every two days without the need for direct sunlight.

Kumaran was inspired to focus on microgreens due to their alignment with sustainable practices, such as promoting good health, well-being, and responsible consumption.

He initially grew microgreens while studying at ITE and found the process fascinating and rewarding.

Kumaran plans to donate all proceeds to Unicef and aims to expand his business further.

Through **word of mouth**, Micro Munch has had significant sales amongst younger and middle-aged customers, reflecting a growing interest in healthy eating.

The initiative encourages Singaporeans to engage more with food sustainability and appreciates the impact of small-scale actions against global challenges.

Source: Selvakumaran, S.K. (2024). This polytechnic student's microgreens project is now his major passion. The Straits Times. Retrieved from https://www.straitstimes.com/singapore

Dortmund's Vertical Farm: From Microgreens to Plates

The article delves into René Papier's mini-farm based in Dortmund, The Greenspace Manufactory, highlighting its focus on cultivating microgreens—the superfood known for its dense nutritional profile.

Established as a means of producing regional food, Papier's initiative contributes significantly to sustainability and climate protection.

Despite microgreens' nutritional benefits, including high vitamin concentrations that sometimes surpass those of mature vegetables, they do not substitute larger vegetables due to their lack of fiber.

The start-up, supplying around 25 restaurants regularly, employs vertical farming—a method that maximally utilizes space for crop production.

Facing a challenge, the mini-farm's tenancy expired, prompting Papier to seek new premises.

His vision emphasizes solving urban food shortages by bringing agriculture closer to consumers.

The city of Dortmund supports such innovations, enhancing regional food sustainability.

Source: Trüb, K. (2024, December 14). Dortmund's smallest farm grows big ambitions. WDR. Retrieved from https://www1.wdr.de/lokalzeit/landwirtschaft/dortmund-microgreens-superfood-minifarm-100.html

Johnny Gray's Journey: From Patient to Provider

https://youtu.be/yTtLpHPsOvE

Johnny Gray founded Grow Chico in 2023, focusing on microgreens, quail eggs, and heirloom vegetables.

This venture emerged from a life-altering health crisis.

Gray endured broken ankles and multiple surgeries over two and a half years, leading to severe health challenges, including a diabetes diagnosis that temporarily left him in a coma.

Given a dire prognosis at 41, Gray explored nutritional remedies.

Embracing intermittent fasting and switching to a diet rich in heirloom veggies and grass-finished beef, **he achieved remarkable health improvements, eventually reversing his diabetes and eliminating medication dependence.**

He promotes microgreens for their concentrated nutrition and sells his products locally.

Gray's next aim is to expand into fermented salsas and hot sauces.

He raises quail for their nutritious eggs, maintaining his ethos of high nutritional value.

Gray is navigating state licensing to introduce his fermented products into the retail market,

aspiring to enhance community health.

Source: Pullen, S. (2024, December 18). Johnny Gray's Grow Chico offers fresh, nutritious produce after personal health transformation. Action News Now. https://www.actionnewsnow.com/news/johnny-gray-s-grow-chico-offers-fresh-nutritious-produce-after-personal-health-transformation/article_c6e0351a-bce2-11ef-be88-975571e7a7a3.html

Growing Greens: Urban Farming Fights Hunger

In downtown London, Ontario, an innovative urban farming initiative known as The PATCH is transforming office spaces into productive green hubs aimed at combating food insecurity.

Spearheaded by Joe Gansevles and supported by community partners, the project operates three farms.

Two of these are indoor setups: one at the Western Fair District and another on Dundas Street, while an outdoor garden serves as the third unit.

Indoor farms boast the ability to produce between 700 and 800 pounds of microgreens yearly, an impressive feat given the minimal equipment costs of around $3,000 for shelves, fans, and lighting.

The PATCH does more than provide nutritious foods; it is an educational platform and a community builder, particularly empowering adults with disabilities.

Participants gain vital agricultural skills and a deeper understanding of nutrition, enhancing their lives both socially and professionally.

Among those positively impacted is Faye Simmons, who highlights the initiative's role in fostering new friendships and providing fulfilling activities.

Holly Puglsey, who manages the farms, describes the work as "a dream come true," noting its significant impact in raising awareness and inspiring a broader connection to sustainable practices.

The program aims to encourage replication of their model, advocating for reduced food insecurity through modest personal urban agriculture initiatives.

This effort, intertwined with Hutton House's broader mission, demonstrates the success of small-scale urban farming in generating significant community benefits.

It provides a duplicate-friendly model that could alleviate food shortages and enrich community life if adopted widely, ultimately blending urban innovation with environmental consciousness.

Source: Donnini, A. (2024, December 28). Growing food for those in need from a downtown office? Cheap and easy, says London charity. CBC News. https://www.cbc.ca/news/canada/london/growing-food-for-those-in-need-from-a-downtown-office-cheap-and-easy-says-london-charity-1.7419287

Certified Naturally Grown's List of Winter Conferences

Certified Naturally Grown

Conference season is about to be in full swing!

Farm conferences are a wonderful way to learn and connect with growers in a vibrant regional context. Below is a short list of conferences aligned with CNG's sustainable farming ethos.

Make sure to tag us in your conference photos @cngfarming!

January 10-12, 2025 – Roanoke, VA	Virginia Association for Biological Farming Conference (VABF)
January 17-18, 2025 – Silver Spring, MD	Future Harvest
January 23-25, 2025 – Frankfort, KY	Organic Association of Kentucky Annual Farming Conference (OAK)

January 24-25, 2025 – Montrose, CO	Western Co. Health, Food & Farm Forum
January 29th-February 1st, 2025 – Hot Springs, AR	Arkansas Grown Conference & Expo
February 4-6, 2025 – Atlanta, GA	SOWTH
February 5-7, 2025 – Lancaster, PA	PASA Sustainable Agriculture Conference
February 13-15, 2025 – Newark, Ohio	Ohio Ecological Food and Farming Association Conference
February 15, 2025 – Burlington, VT	Northeast Organic Farming Association of Vermont (NOFAVT)

Source: *Certified Naturally Grown*. (2024, October 2). Certified Naturally Grown's List of Winter Conferences. https://www.naturallygrown.org/certified-naturally-growns-list-of-winter-conferences/

FEATURED ARTICLE

Sulforaphane: Getting the Most From Your Broccoli Microgreens With New Research

In an era where chronic diseases affect 60% of Americans, researchers have focused on **sulforaphane (SFN)**, a remarkable compound abundant in broccoli microgreens.

This focus gained momentum after Dr. Paul Talalay's Laboratory at Johns Hopkins discovered **sulforaphane glucosinolate's** health-

promoting properties in 1992, a breakthrough featured in The New York Times and recognized among **the century's top scientific discoveries.**

Broccoli microgreens contain up to **100 times more** sulforaphane than mature plants. This potent isothiocyanate ($C_6H_{11}NOS_2$) forms when glucoraphanin interacts with myrosinase enzymes **during cutting or chewing**. While raw consumption maximizes benefits, light steaming can preserve bioavailability.

The microgreens' advantage lies in their harvest timing - between 7-21 days after germination - when nutrient density peaks. Their cultivation requires minimal resources while delivering maximum health benefits, making them increasingly central to health-conscious meal planning.

Research highlights SFN's anti-inflammatory, antioxidant, and anti-cancer properties.

> One compelling case study describes a patient whose stage 2 prostate cancer resolved after incorporating daily broccoli microgreens into his diet over several years, though individual results may vary.

For optimal benefits, natural food sources are preferred over supplements due to the presence of cofactors that enhance SFN absorption.

This aligns with the growing shift toward preventative health measures through dietary choices, as healthcare costs exceed $8 trillion annually.

The Science Behind Sulforaphane Formation in Microgreens

https://www.youtube.com/watch?v=8UHdCvawaTc

The creation of sulforaphane in broccoli microgreens begins with **glucoraphanin (GRN).** It is an inactive compound that transforms when plant cells release myrosinase enzymes through cutting or chewing.

This conversion can also occur via gut bacteria, though less efficiently.

Broccoli microgreens contain high concentrations of GRN, comparable to mature sprouts. Notably, GRN remains stable during cold storage, **making microgreens a reliable sulforaphane source even days after harvest with proper refrigeration**.

Myrosinase, the crucial enzyme that converts GRN to sulforaphane through hydrolysis, activates only when plant cells are damaged. However, heat exposure can deactivate this enzyme, making raw consumption or light steaming optimal for preserving benefits.

The gut microbiome plays a vital backup role in sulforaphane production when plant-based myrosinase is inactive. Individual variations in gut bacteria explain why some people metabolize GRN more efficiently than others.

Bioavailability depends on several factors, including cooking methods and food pairing. Combining cooked broccoli with raw radish or mustard seeds, which contain active myrosinase, can enhance sulforaphane formation and absorption.

Health Benefits of Sulforaphane: A Focus on Microgreens

Sulforaphane (SFN) demonstrates remarkable cancer-fighting abilities through multiple mechanisms, including cell cycle regulation and apoptosis induction. Its antioxidant and anti-inflammatory properties protect cells and reduce chronic inflammation.

Cancer Type	Primary Effects	Key Mechanisms
Skin Cancer	Growth inhibition	DNA protection, anti-inflammation
Breast Cancer	Apoptosis induction	Hormone regulation, stem cell targeting
Prostate Cancer	Tumor suppression	Androgen receptor blocking
Oral Cancer	Cell death activation	Oxidative stress modulation

Beyond cancer prevention, SFN activates the Nrf2 pathway, enhancing cellular defense against oxidative stress. It shows promise in treating various conditions:

Condition	Benefits
Type 2 Diabetes	Blood sugar regulation

Autism	Improved social interaction
Cardiovascular	Blood pressure management
Kidney Health	Oxidative stress reduction
Neuroprotection	Cognitive function support

Maximizing Sulforaphane Intake from Broccoli Microgreens: Practical Strategies

Getting the most sulforaphane from **broccoli microgreens** requires attention to key factors affecting formation and bioavailability.

For optimal storage, select microgreens with vibrant colors, firm stems, and fresh leaves. Store in containers lined with damp paper towels at 35-40°F (2-4°C), maintaining humidity without excess

moisture. While microgreens can last a week, they are consumed within days for peak benefits.

Preparation techniques significantly impact sulforaphane formation. Use the "**chop and wait**" method - cut microgreens and wait 1-2 minutes before consuming to activate myrosinase enzymes. Light steaming preserves nutrients, but avoid boiling.

Combine with myrosinase-rich foods like mustard powder for enhanced benefits.

While supplements are available, whole-food sources provide superior benefits through natural cofactors and complementary nutrients. Strategic food pairings, especially with vitamin C-rich foods, boost absorption.

Individual factors affecting absorption include:

Factor	**Impact**	**Consideration**
Gut Microbiome	Affects conversion	Bacterial population variation
Genetic Variations	Enzyme activity	Processing efficiency differs
Metabolism	Absorption rate	Individual differences

These variations suggest personalizing consumption patterns based on individual responses. Consider factors like serving size and frequency for optimal benefits.

- Arugula
- Bok choy
- Broccoli
- Brussels sprouts
- Horseradish
- Kale
- Radishes
- Rutabaga

- Cabbage
- Cauliflower
- Collard greens
- Turnips
- Watercress
- Wasabi

Remember that a diet consistently rich in **cruciferous vegetables**, including broccoli microgreens, provides the foundation for **optimal health benefits**.

New Research on Broccoli Microgreens and Sulforaphane

Recent studies reveal distinct differences between **microgreens** and sprouts in their sulforaphane profiles.

While both contain significant glucoraphanin (GRN) levels, microgreens demonstrate unique advantages in bioavailability and gut health interactions, as shown in Wang et al.'s 2023 pilot study.

Bioavailability research confirms efficient sulforaphane absorption from microgreens into the systemic circulation, with both parent compounds and metabolites detected in biological samples.

Nutrient synergy in microgreens enhances absorption compared to mature broccoli.

Optimal growing conditions for maximizing sulforaphane content include:

- Temperature: 18-22°C (64-72°F)
- Light cycle: 16 hours on/8 hours off
- Controlled stress factors (moderate salt exposure or drought)
- Hydroponic methods for precise nutrient delivery
- Mineral supplementation (sulfur and selenium)

While single servings don't significantly alter gut microbiome diversity, consistent consumption as part of a fiber-rich diet may provide better long-term benefits.

Recent metabolomic analyses show microgreens contain substantial levels of SFN-nitriles and other bioactive compounds, making them a concentrated, space-efficient source of beneficial compounds compared to mature broccoli.

Challenges and Future Directions

Individual response variability to sulforaphane (SFN) presents a significant research challenge. Factors affecting SFN metabolism include genetic differences in detoxification enzymes, gut microbiota composition, and existing health status. Even the timing of consumption can impact absorption rates.

Current evidence comes primarily from laboratory and animal studies, highlighting the **critical need for human trials**. Wang et al.'s 2023 pilot study on gut microbiota effects represents progress. But, larger-scale studies are needed, particularly for cancer prevention and inflammatory conditions.

Dosage standardization remains complex due to varying bioavailability and therapeutic targets. While studies suggest 20-40 mg SFN daily may offer benefits, optimal doses likely differ based on health goals:

- Cancer prevention
- Anti-inflammatory effects
- Detoxification purposes

Long-term research gaps include:

- Safety profiles for sustained consumption
- Medication interactions
- Cumulative effects
- Impact on cellular pathways
- Standardization protocols

Promising developments include SFN's potential as a **chemosensitizing agent**, possibly enhancing conventional cancer treatments while reducing side effects. This suggests opportunities for integrated treatment protocols.

Public health implications are significant, as microgreens offer a **cost-effective prevention strategy**. Implementation requires coordinated efforts between healthcare providers and community organizations, focusing on education about growing techniques and realistic benefit expectations.

Wrap-up: Broccoli Microgreens and SFN

Broccoli microgreens represent a concentrated, bioavailable source of sulforaphane (SFN), containing up to 100 times more glucoraphanin than mature plants. Research consistently validates their potent anti-cancer, anti-inflammatory, and antioxidant properties through well-documented biochemical pathways.

These **nutrient-dense sprouts** offer versatile integration into daily diets through:

- Smoothies
- Sandwiches
- Salads
- Garnishes

While further research is needed to establish optimal consumption methods and dosing, current evidence strongly supports including microgreens in balanced diets for preventive health. Their quick growing time and concentrated nutrient content make them an accessible, effective addition to health-conscious diets.

To stay informed about developments, follow peer-reviewed journals, attend agricultural workshops, or join nutritional research communities. This emerging field continues to reveal new applications in disease prevention and therapeutic treatments.

References

The references listed below represent the key scientific literature consulted in the creation of this article on **sulforaphane** and **broccoli microgreens**.

These peer-reviewed publications span several areas of research, including sulforaphane's **bioavailability**, its **anti-cancer properties**, and its effects on human health when consumed through broccoli microgreens.

The comprehensive reference list allows readers to investigate specific aspects of the research in greater detail and verify the scientific foundations of the information presented.

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These citations span several years (2006-2024) from diverse scientific journals, offering perspectives from biochemistry, nutrition, oncology, and agricultural sciences, reflecting the current understanding of **sulforaphane benefits** and **broccoli varieties**. These **peer-reviewed sources** encompass studies on **microgreens**

cultivation, **dietary strategies**, and **health supplements**, providing scientific backing for the information presented.

Notable contributions include Ahmed et al.'s (2006) groundbreaking work on sulforaphane measurement methods, Fahey et al.'s (2015) research on bioavailability, and recent investigations by Wang et al. (2023) exploring microgreen consumption effects on **gut health**.

Each reference was carefully selected to guarantee accuracy and relevance, with particular attention paid to studies featuring robust methodologies and significant findings.

This comprehensive approach helps readers access authoritative information for further exploration of topics like sulforaphane metabolism, **cancer prevention mechanisms**, and **optimal growing conditions** for broccoli microgreens.

Medical Disclaimer

The information provided in this article by Microgreens World and related materials is for educational purposes only and should not be considered medical advice. Always consult with a qualified healthcare professional before making any changes to your diet, lifestyle, or health regimen. The author and publisher are not responsible for any consequences resulting from the use of this information, and readers assume full responsibility for their actions based on it.

Evidence-based Expertise

Boost Yields: Perfect Sowing Density for Microgreen

Figure 1. Microgreen height above the substrate is calculated as an average of three measurements at the sides and centre of the canopy (in this image, an example of a cress).

A recent research paper explores the impact of **sowing density on the growth, yield, and quality** of microgreens, specifically rapini, kale, and cress.

Microgreens, renowned for their rapid growth cycle and nutrient density, require careful management of sowing density to balance cost and productivity.

In the study by Angelo Signore, Annalisa Somma, Beniamino Leoni, and Pietro Santamaria from the University of Bari Aldo Moro, several key findings are highlighted.

The research demonstrates that different species and landraces respond uniquely to sowing densities, affecting yield and various growth parameters.

The experiments utilized indoor cultivation techniques, focusing on landraces of rapini (Cima grande and Fasanese), kale (Barese and Altamura), and commercial cress across different sowing densities.

The results showed that higher sowing densities generally led to increased yields but could also negatively affect certain development stages, such as true leaf length.

For instance, rapini yielded up to 55% more when

harvested later at higher densities.

However, increased density also led to resource competition, affecting growth uniformity and developmental stages.

The findings suggest that optimal sowing density varies, and growers might need to tailor their approach based on desired yield and crop characteristics.

SUMMARY

This is a research article published in *Horticulturae* that examines the effects of sowing density on microgreen production.

The study focuses on rapini, kale, and cress, comparing different species and landraces.

Researchers investigated the impact of varying sowing densities and harvest times on yield, growth parameters, and quality characteristics.

Their findings highlight the importance of carefully selecting sowing density, species, and harvest time to optimize microgreen production and control costs.

The results suggest that locally available landraces offer cost-effective alternatives to commercial varieties.

Moreover, the study underscores the economic benefits of using locally sourced landraces, potentially reducing seed costs and influencing sowing density choices.

The research also addresses the trade-offs in choosing landraces and growing conditions to enhance specific characteristics such as nutritional content and shelf life.

In conclusion, the study provides valuable insights into optimizing microgreen production, highlighting the importance of species selection and density management to maximize yield, quality, and economic feasibility.

For practical application, it suggests strategies for growers to achieve desired outcomes considering species, developmental stage, and market demands.

Source: Signore, A., Somma, A., Leoni, B., & Santamaria, P. (2024). Optimising sowing density for microgreens production in rapini, kale and cress. Horticulturae, 10(3), 274. https://doi.org/10.3390/horticulturae10030274

Cultivation Techniques

Yield Boost for Healthier Microgreen Varieties

This article explores the cultivation of Brassica microgreens under different fertilization and substrate conditions.

These microgreens, which include radish, red cabbage, white mustard, and red mizuna, are valued for their high levels of bioactive compounds, including glucosinolates, phenolic compounds, and ascorbic acid. The study evaluates how different substrates and nutrient solutions affect the yield, morphology, and phytochemical profiles of these microgreens.

The research found that the use of sulfur-enriched nutrient solutions and nutrient-rich substrates significantly increased yield, with reported increases of up to 30% compared to a distilled water control. While these nutrient solutions elevated yields, they did not dilute glucosinolate levels, which remain consistent irrespective of increased biomass.

Additionally, conditions with nutrient restrictions were shown to elevate the levels of vitamin C and phenolic compounds in the microgreens. The findings underline the impact of controlled agronomic practices on the enhancement of microgreen functionality, proposing that through careful substrate and fertigation management, the levels of beneficial phytochemicals can be optimized.

The targeted differential impact of nutrient solutions, particularly sulfur's role in glucosinolate fortification, provides a valuable basis for improving the functional quality of microgreens.

This approach highlights the interplay between nutrition and microgreen yield and offers strategies for enhanced production of health-promoting compounds.

Source: Alloggia, F. P., Bafumo, R. F., Ramírez, D. A., Heredia Martín, J. P., Maza, M. A., & Camargo, A. B. (2024). Enhancement of yield and functional quality of Brassica microgreens: Effects of fertilization and substrate. *Food Chemistry*, 142594. https://doi.org/10.1016/j.foodchem.2024.142594

LED Grow Lights for Beginners

https://youtu.be/TgGnIA0AjLc

Shopping for LED grow lights online?

Karla Garcia, technical service specialist for Hort Americas, shares her advice to help you make the best choice.

Whether you're browsing Amazon.com or other online retailers, you must know what mistakes to avoid because they can get costly.

Shedding Light on Microgreens: A Comprehensive Guide to Microgreens Lighting Requirements

Microgreens require ample light for healthy growth. The best light for microgreens is full-spectrum, mimicking natural sunlight. Focusing on wavelengths of blue (440-470nm) and red (640-680nm) is crucial for photosynthesis. Light intensity, measured in photosynthetic photon flux density (PPFD), should be around 200-400 µmol/m²/s. A photoperiod of 12-16 hours daily is recommended for optimal growth.

CONTINUE READING

Key considerations include light Intensity, connection seals, efficiency, and the warranty.

You'll also see why cheap, low-quality lamps may seem like a good deal but why you may need to replace them in as little as 6 months.

MSU vegetable short course set for Feb. 25-26

VERONA, Miss. -- Current and prospective commercial vegetable growers can learn about specialized production methods during Mississippi State University's **2025 Vegetable Short Course Feb. 25-26.**

The course will be held at the North Mississippi Research and Extension Center's Magnolia Building in Verona from 8 a.m. to 5 p.m. each day.

It is open to greenhouse, high-tunnel, and field vegetable producers throughout the Southeast.

Attendees will learn about vegetable management practices for growing tomatoes, lettuce, and other crops via greenhouse, high-tunnel, and field production.

Participants will attend educational sessions and participate in hands-on activities.

Topics include microgreens, nutrient management, pesticide safety, floating growing systems, and insect and disease issues.

Speakers will also present information on current tomato, strawberry, and lettuce research.

Vendors will offer various goods and services.

Preregistration is available until Feb. 15

PRE-REGISTER!

Preregistration is $40 per person. On-site registration is $50 for both days or $25 for one day per person.

The fee covers conference materials, lunch, and refreshments.

The Magnolia Building is located at 5395 Mississippi Highway 145 South.

The event is organized by personnel with the MSU Extension Service and Mississippi Agricultural and Forestry Experiment Station.

Emerging Industry News

Broccoli Microgreens Market Growth and Opportunities

The broccoli microgreens market is poised to grow significantly, from a value of $237.20 million in 2021 to an estimated $398.5 million by 2031, with a CAGR of 5.5%.

This growth is driven by increased adoption of indoor agriculture, offering advantages like protection from extreme weather, efficient resource use,

and reduced pest risks. The market is buoyed by technological advances in indoor farming, such as vertical farming and greenhouse systems utilizing AI and hydroponics.

Indoor agriculture is becoming essential as traditional farming faces challenges like declining fertile land and poor weather, which cannot meet the needs of the growing population.

The UN projects the global population will rise from 7.6 billion to 11.2 billion by 2100, increasing food demand. Despite the market potential, challenges include high initial setup costs, a lack of skilled labor, and limits in variety.

The European region has shown a dominant market presence and is expected to continue this trend. Key players in the market include AeroFarms, Gotham Greens, and Bowery Farming.

For sustained growth, effective distribution networks and marketing strategies are crucial. Increased urbanization and more retail establishments contribute to greater market opportunities for microgreens.

Online retail and farmers' markets also support market expansion, **underscoring a need for awareness and education on microgreens' benefits**.

Source: Allied Analytics LLP. (2024, December 19). Broccoli microgreens market size to reach $398.5 million by 2031 with a CAGR of 5.5%. EIN Presswire. https://www.einnews.com/pr_news/770309625/broccoli-microgreens-market-size-to-reach-398-5-million-by-2031-with-cagr-of-5-5

Commercial Best Practices

Fighting Fire with Hemp Microgreens: Nutrient-Powered Health

The article details the collaboration between Nanobles Corporation's Global Cannabinoid Research Center (GCRC) and Rich Farms to

develop a **hemp microgreens initiative aimed at cancer prevention among firefighters**.

This partnership is part of GCRC's Phyto-Food Research Initiative, which utilizes the USDA-approved Rich Farms to cultivate nutrient-dense hemp microgreens.

The initiative addresses the increased cancer risk faced by firefighters due to exposure to carcinogens during their duties. Research reveals that firefighters experience a significantly higher risk of cancer diagnosis and mortality compared to the general population, exemplified by the 2023 statistic where cancer constituted the lead cause of line-of-duty deaths among firefighters.

This groundbreaking venture aims to integrate hemp into the diets of high-risk groups to promote health and immune function.

Hemp seeds contain Edestin, a unique protein

From Controversy to Cuisine: Hemp Microgreens and the Next Big Health Revolution

Discover hemp microgreens: nutrient-packed, controversy-free Cannabis powerhouses. Explore health benefits, culinary uses, and sustainable growing practices for this emerging superfood.

CONTINUE READING

compatible with human blood plasma, which is crucial for enhancing digestion, supporting immune functionality, and potentially mitigating carcinogen-related damage.

CEO Mike Robinson stresses hemp's comprehensive nutritional value, highlighting its protein profile that boosts the body's ability to ward off environmental risks effectively.

Hemp proteins, unlike soy, **lack digestive inhibitors**, making them more suitable for preventive nutrition. The initiative envisions informed dietary changes and public health strategies from comprehensive data collection, spotlighting the health benefits of plant-based nutrition.

The joint venture compliments the organizations' pursuit of innovative hemp-derived products, transcending existing limitations in hemp research and cultivation due to regulatory constraints.

Robinson expresses optimism regarding the forthcoming Farm Bill reauthorization in 2025, which could dismantle significant barriers. The collaboration encapsulates research and product development efforts such as Superior Hemp Flour, further broadening the scope of hemp's utility.

This initiative represents a step forward in preventative health strategies, positing phyto-foods at the heart of disease prevention.

By embedding these concepts into everyday diets, GCRC seeks to enhance gut health, nutrient absorption, and overall resilience against diseases, empowering those facing occupational hazards, especially firefighters.

The effort underscores the potential impact of leveraging nutrient-rich plants like hemp to

create a sustainable and health-focused future.

Source: Robinson, M., & Uhalley, D. (2024, December 22). GCRC partners with Rich Farms to launch hemp microgreens initiative for cancer prevention in firefighters. *EIN Presswire*. https://www.einpresswire.com/article/771065225/gcrc-partners-with-rich-farms-to-launch-hemp-microgreens-initiative-for-cancer-prevention-in-firefighters

Year-Round Farming: Office Spaces Go Green

Green Farm N.L., located in Mount Pearl, is redefining agricultural practices by producing leafy greens, herbs, and microgreens inside a commercial office building throughout the year.

Utilizing hydroponics, which eliminates the need for soil by growing plants in water, founder Scott Neary addresses the province's challenge of sourcing fresh produce year-round. This innovative approach not only ensures a constant supply of high-quality greens but also substantially reduces the carbon footprint associated with traditional farming and food importation.

Serving approximately 250 households and numerous restaurants in St. John's and the surrounding areas, Green Farm N.L. employs **delivery and subscription models** to distribute its products.

This enterprise significantly contributes to combatting food insecurity, with the province relying on imports for about 90% of its food supply as these imports suffer from high costs, poor quality, and an environmental toll.

Neary aspires to expand the 2,000-square-foot retrofitted office operation to a 10,000-square-foot warehouse to include crops like tomatoes,

strawberries, and hot peppers. This expansion aims to enhance production capacity and widen the reach within Newfoundland and Labrador.

Source: CBC News. (2024, December 16). When the office building is also a farm: Mount Pearl company makes growing season last all year long. CBC News. Retrieved from http://www.cbc.ca/

'Plant More. Plan Less': Smarter Farming Solution

The article discusses the innovative software Microgreen Manager, tailored for microgreen farmers to streamline their operations.

Co-founded by brothers Garrett and Spencer Corwin, the software was designed to address the challenges of microgreen production, such as crop planning and order fulfillment.

Spencer, previously a software engineer at Meta, and Garrett, an experienced microgreen farmer, pooled their expertise to create this tool that automates and organizes farming tasks, reducing manual errors and allowing growers to focus on producing high-quality microgreens.

The software is equipped to handle various stages of the production process, providing detailed schedules and tracking tools for efficient farm management.

Previously available as a free beta, Microgreen Manager plans to transition to a paid model in 2025, introducing new features like inventory tracking and e-commerce integration.

The software aims to support the growing demand for local

produce and foster success in the expanding microgreens market.

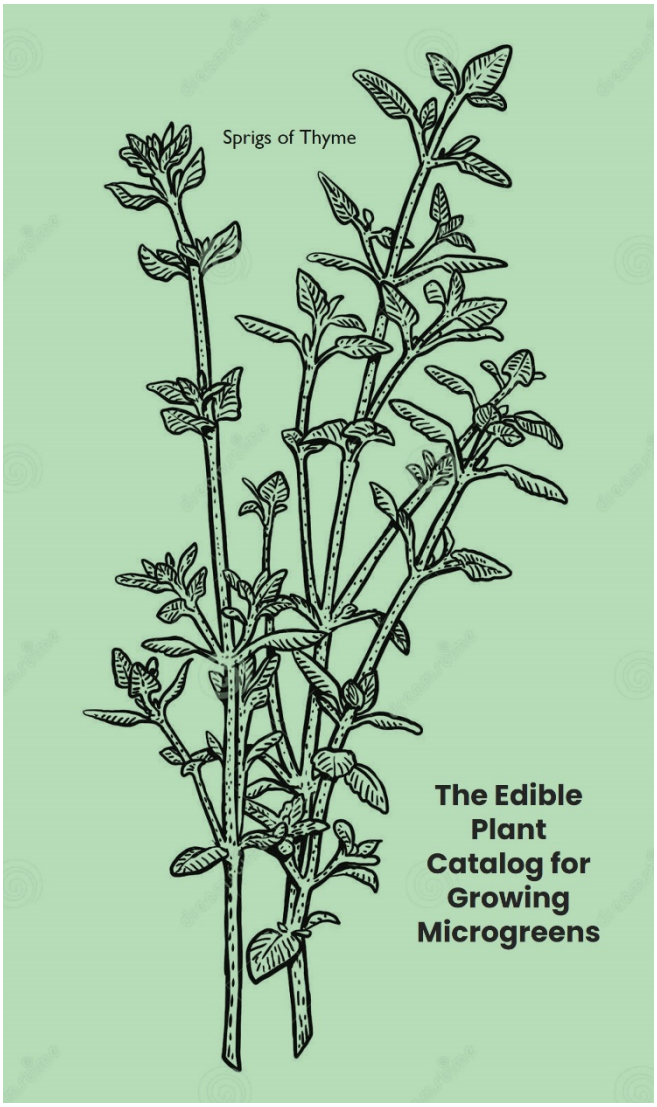
Source: VerticalFarmDaily.com. (2024, December 19). Plant More. Plan Less. https://verticalfarmdaily.com

Insider Secrets: Using trends to maximize microgreen sales

In this interactive workshop, dive deep into the strategies and tools to scale microgreens businesses by leveraging current consumer trends in sustainability and health-conscious eating.

Source: Microgreen Workshop. (2024, November 4). *Microgreens workshop: Maximizing sales through current trends* [Video]. YouTube. https://youtube.com/watch?v=5PyKcu7GkP4

The Edible Plant Catalog for Growing Microgreens



Discover a wealth of possibilities in microgreen cultivation with our meticulously curated guide featuring **over 200 edible plant species**.

Each entry outlines specific growing requirements to jumpstart your microgreens growing journey, offering insights into optimal light, temperature, and watering conditions.

This invaluable resource caters to commercial growers, researchers, and home gardeners seeking to broaden their horizons beyond traditional crops.

Embrace this opportunity to innovate and contribute to the expanding field of microgreens, enhancing your expertise while enjoying the unique flavors and nutritional benefits of diverse plant varieties.

LEARN MORE

Brought to you by **Doc Green**, Andrew Neves' personally trained AI assistant. "You may ask me anything about microgreens."

Publisher: Microgreens World

Editor: D. Andrew Neves, andrew.neves@microgreensworld.com

Advertising: marketing@microgrenworld.com

Guest Posting: Our Guest Post Guidelines