Volume 2024 Number 39 MICROGREENS WORLD Monday October 21 2024

WEEKLY DIGEST

EAT YOUR WAY TO HEALTHIER SKIN WITH MICROGREENS

INDOOR VERTICAL FARMS ARE HUGE ENERGY CONSUMERS

CREATIVE RECIPES: Radiant Skin Green Juice Boost
NUTRITION SCIENCE: Radish Microgreens are a Potent Antioxidant Powerhouse
EVIDENCE-BASED EXPERTISE: From Backyard to Michelin Stars: A Microgreen Revolution

"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.

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Eat Your Way to Better Skin with Microgreens

Vol. 2024 No. 39 Monday, October 21, 2024

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Transform Your Skin Routine

Tired of skincare products that overpromise and underdeliver?

Discover how microgreens, nature's nutrient-dense powerhouses, can transform your skin from the inside out.

This guide reveals easy, science-backed ways to use microgreens for radiant, youthful skin—plus a ***simple DIY microgreen face mask recipe***.

Take control of your skincare with natural, proven results. Start glowing today!

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Nutrition Science

Radish Microgreens: A Potent Antioxidant Powerhouse Surpassing Mature Leaves

The scientific evidence is mounting (*in vitro*), calling for clinical studies (*in vivo*).

Microgreens are significantly more nutrient-dense than their mature plants.

In their recent study, Dhanalakshmi G. et al., 2024, examined the antioxidant properties of **Raphanus sativus (radish) microgreens** compared to mature radish leaves.

The key findings include:

1. Microgreens, especially dry microgreens, contain higher levels of phytochemicals and antioxidants compared to mature radish leaves.
2. The total phenolic content was highest in dry microgreens (345.5 mg/g), followed by wet microgreens (330.0 mg/g), dry mature leaves (252.45 mg/g), and wet mature leaves (212.15 mg/g).
3. In the DPPH free radical scavenging assay[1], dry microgreens showed the highest antioxidant activity (84.41 µg/ml), even surpassing the standard ascorbic acid (75.13 µg/ml).
4. The IC50 value, indicating antioxidant potency, was lowest (most potent) for dry microgreens at 34.35 µg/ml, compared to 46.43 µg/ml for ascorbic acid.

5. Molecular docking studies (*which simulate protein-drug interactions computationally*) suggested that certain phytochemicals in radish (*quercetin, epicatechin, 3-hydroxy-beta-ionone, and p-coumaric acid*) may have higher antioxidant efficacy than gallic acid when interacting with the target protein cytochrome P450.

The conclusions highlight that radish microgreens, particularly in dry form, have superior antioxidant properties compared to mature leaves and could be a potent source of dietary antioxidants.

For microgreens growers, these results demonstrate the high nutritional value of their product, potentially allowing them to market microgreens as a premium health food.

The study provides scientific evidence to support claims of enhanced nutritional benefits.

For microgreens consumers, this research indicates that incorporating radish microgreens into their diet could provide higher levels of antioxidants compared to mature radish leaves.

This may offer enhanced protection against oxidative stress and associated health issues.

The study also suggests that consuming dried microgreens may maximize the intake of beneficial compounds.

Overall, this research underscores the potential of radish microgreens as a functional food with significant

This research article examines the antioxidant properties of **Raphanus sativus** (radish) microgreens and mature leaves. The researchers investigated the **total phenolic content** and **free radical scavenging activity** of both types of radish samples using **in vitro assays** and **molecular docking simulations**. They found that **microgreen dry extract** exhibited **stronger antioxidant activity** than mature leaves, suggesting a potential role for microgreens in **preventing oxidative stress**. Additionally, the **molecular docking studies** indicated that certain phytochemicals, specifically **quercetin, epicatechin, 3-hydroxy-beta-ionone, and P-coumaric acid**, may be more effective than gallic acid (a positive control) in **interacting with cytochrome P450** and contributing to antioxidant activity.

antioxidant properties, benefiting both producers and consumers in the growing microgreens market.

1. *The DPPH free radical scavenging assay is a simple test that measures how well a substance can neutralize harmful molecules called free radicals. It uses a purple chemical (DPPH) that turns yellow when it encounters antioxidants, allowing scientists to gauge the antioxidant strength of various compounds or food extracts.*

Source: Dhanalakshmi G., Kusuma M., Pushpa T.D., Megha M., Anuradha M. (2024). In Vitro and In Silico Study of Antioxidant Effect on Raphanus sativus Microgreens and Mature Leaf. *International Journal of Pharmaceutical Sciences Review and Research*, 84(5). https://doi.org/10.47583/ijpsrr.2024.v84i05.011

Creative Recipes

Radiant Skin Green Juice Boost

This refreshing green juice combines nutrient-rich vegetables and fruits with powerful microgreens to support skin health from within.

The blend of ingredients provides a concentrated dose of vitamins, minerals, and antioxidants that nourish your skin and promote a healthy glow.

Recipe Information:

- Prep Time: 10 minutes
- Cook Time: 0 minutes
- Total Time: 10 minutes
- Category: Beverage

- Method: Juicing
- Cuisine: Health/Fusion
- Yield: 2 servings (about 16 oz)

Ingredients:

- 1 cucumber
- 2 celery stalks
- 1 green apple
- 1/2 lemon, peeled
- 1 inch piece of ginger
- 1 cup spinach
- 1/4 cup broccoli microgreens
- 1/4 cup sunflower microgreens
- 1/4 cup red cabbage microgreens
- Ice cubes (optional)

Preparation:

1. Wash all produce thoroughly.
2. Cut the cucumber, celery, and apple into pieces that will fit through your juicer.
3. Peel the lemon and ginger.
4. Feed the cucumber, celery, apple, lemon, ginger, and spinach through the juicer.
5. Stir in the microgreens.
6. Pour over ice if desired and serve immediately.

Plating:

- Serve the juice in tall, clear glasses to showcase its vibrant green color.
- Garnish with a few extra microgreens on top for added visual appeal and a hint at the nutritional powerhouses within.

Benefits:

1. Broccoli microgreens: Rich in sulforaphane, which has anti-inflammatory properties and may help protect skin from UV damage.
2. Sunflower microgreens: High in vitamin E, which acts as an antioxidant and helps maintain skin moisture.
3. Red cabbage microgreens: Packed with vitamin C, essential for collagen production and skin elasticity.

Community News

Pandemic Hobby Sprouts Into Thriving Local Microgreens Business

Steve and Bobbie Leinweber started Bee Line Microgreens, a microgreens business, during the COVID-19 pandemic.

Initially a hobby, it grew into a successful venture selling nutritious microgreens at farmer's markets and through subscriptions.

The couple now participates in multiple markets in Chicago, IL.

It has partnered with a local school to teach students about microgreens.

Key takeaways for aspiring growers:

1. Start small and experiment with different varieties.
2. Leverage existing networks to build an initial customer base.
3. Expand gradually through farmer's markets and subscription services.
4. Look for educational partnerships to give back to the community.
5. Consider hyper-local focus to differentiate from larger producers.

Source: Lynch, J. (2024, October 15). Couple finds nutrition with microgreens firm. *The Beverly Review*. https://www.beverlyreview.net/news/community_news/article_d8c01498-8b10-11ef-9820-2f9db8aa7ba5.html

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!

November 2-3, 2024 – Durham, NC	Carolina Farm Stewardship Association (CFSA)
November 15-16, 2024 – Vancouver, WA	Tilth Alliance Conference
December 17-19, 2024 – Manchester, NH	New England Vegetable and Fruit Conference (NEVF)
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/

Evidence-based Expertise

From Backyard to Michelin Stars: A Microgreen Revolution

This is the inspiring journey of Malaia's Microgreens. This small-scale indoor farming

business grew from a backyard shed to supplying microgreens to Michelin Star restaurants in California.

Founded by Malaia Martinez and Jaebin Yoo in 2020, the company started with limited resources and no prior experience in agriculture or business.

Despite facing numerous challenges, including financial constraints and relocations, the founders' passion, perseverance, and innovative problem-solving helped them scale their business successfully.

The article highlights several key aspects of Malaia's Microgreens' growth:

- *Overcoming resource limitations*: As a small-scale grower, the company faced challenges competing with well-funded players. They overcame this by being creative and developing their own proprietary farm technology to improve efficiencies at manageable costs.
- *Customer focus*: Their primary customers are fine dining establishments and chef-owned restaurant concepts. By prioritizing quality, food safety, and extended shelf life, they have successfully partnered with every Michelin Star restaurant in Orange County, California.
- *Partnership strength*: The founders emphasize that their complementary skills and shared commitment to perseverance have been crucial to their success.

- *Business challenges*: The article notes that the business operations side has been more challenging than the actual farming, highlighting the importance of understanding costs and driving sales.
- *Future plans*: With a recent $250,000 grant from the California Department of Food & Agriculture, Malaia's Microgreens plans to expand its facilities, collaborate with major produce distributors, invest in community outreach, and develop proprietary systems.

Key takeaways for aspiring growers:

1. Embrace challenges and be willing to take calculated risks.
2. Focus on quality and building strong relationships with customers.
3. Develop innovative solutions to overcome resource limitations.
4. Treat indoor farming as a business, understanding all associated costs.
5. Seek help and build a strong support system.
6. Be prepared for the business operations side to be as challenging as the farming itself.
7. Continuously look for opportunities to scale and improve operations.

Source: Indoor Ag-Con. (2024, October 15). From Backyard Shed to Michelin Star Supplier: Malaia's Microgreens' Indoor Farming Journey. *Indoor Ag-Con*. https://indoor.ag/from-backyard-shed-to-michelin-star-supplier-malaias-microgreens-indoor-farming-journey/

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FEATURED ARTICLE

Eat Your Way to Healthier Skin with Microgreens

Ever looked in the mirror and wondered why your skin isn't as radiant as it used to be?

You're not alone.

Many of us battle with skin issues, from pesky breakouts to the telltale signs of aging.

But what if I told you that the secret to healthier skin might be hiding in your salad bowl?

Let's talk about microgreens - nature's tiny powerhouses.

The Mighty Microgreen: More Than Just a Garnish

Microgreens aren't just those cute little sprouts chefs use to make your plate look fancy.

They're nutrient-dense superfoods that pack a serious punch when it comes to skin health.

But don't just take my word for it.

Research shows that microgreens can contain up to 40 times more vitamins and minerals than their fully-grown counterparts (Xiao et al., 2012).

That's like getting a whole garden's worth of nutrients in every bite!

Why Your Skin Craves Microgreens

Your skin is hungry.

It's craving vitamins, minerals, and antioxidants to keep it looking fresh and youthful.

And microgreens are like an all-you-can-eat buffet for your skin.

Take vitamin C, for instance.

This antioxidant superhero is crucial for collagen production, which keeps your skin firm and elastic.

Studies have shown that a diet rich in vitamin C can help reduce the appearance of wrinkles (Pullar et al., 2017).

But here's the kicker: *red cabbage microgreens* can contain up to 6 times more vitamin C than mature red cabbage (Xiao et al., 2012). Talk about getting more bang for your buck!

The Eczema Connection: A Personal Journey

Now, let me get personal for a moment.

Both my sons and I have battled with eczema.

It's a frustrating condition that can leave your skin feeling dry, itchy, and inflamed.

But through my research and personal experience, I've found that certain microgreens can be a game-changer for eczema-prone skin.

Broccoli microgreens, for example, are rich in sulforaphane, a compound that's been shown to have anti-inflammatory properties.

One study found that applying broccoli sprout extracts to the skin could help reduce inflammation and protect against UV damage (Dinkova-Kostova et al., 2007).

Microgreens: Your Skin's New Best Friend

So, how exactly do microgreens work their magic on your skin?

It's all about giving your body the tools it needs to build and maintain healthy skin from the inside out.

1. *Hydration Station*: Microgreens like cucumber are packed with water, helping to keep your skin hydrated and plump.
2. *Antioxidant Arsenal*: Many microgreens are rich in antioxidants that fight free radicals, those pesky molecules that can cause premature aging.

3. *Vitamin Variety*: From vitamin A for cell turnover to vitamin E for moisture retention, microgreens offer a spectrum of skin-loving vitamins.
4. *Mineral Might*: Minerals like zinc and selenium, found in many microgreens, support skin healing and protect against sun damage.

Incorporating Microgreens into Your Skin Care Routine

Now, I know what you're thinking.

"Great, but how do I actually use these microgreens for better skin?"

Don't worry. I've got you covered.

1. The *Daily Salad Boost*: Sprinkle a handful of microgreens on your salad for an instant nutrient boost.
2. *Smoothie Power-Up*: Blend some microgreens into your morning smoothie. You'll barely taste them, but your skin will thank you.
3. *Microgreen Face Masks*: Yes, you read that right. Some spas are now offering microgreen-infused face masks.
4. *Microgreen-Infused Skincare*: Keep an eye out for skincare products that incorporate microgreen extracts. They're becoming increasingly popular in the beauty world.

Microgreen-infused face masks are gaining popularity in wellness and spa treatments due to the rich antioxidant and anti-inflammatory properties of microgreens.

Spas like those offering the **Eminence Organics Microgreens Detox Collection** use microgreens in a range of skin products, including cleansing oils and detoxifying treatments.

SHOP NOW

This line incorporates microgreen extracts from broccoli, radish, and clover, which are known for their skin-detoxifying properties.

These products are designed to cleanse, hydrate, and protect the skin from environmental stressors.

Additionally, brands such as Farmhouse Fresh also offer skincare products featuring microgreens, particularly in their Watercress Hydration Cascade Gelée moisturizer.

This product leverages the hydrating and antioxidant benefits of watercress microgreens.

If you're looking for a spa experience with microgreens, you may find such treatments in eco-conscious spas or those offering organic skincare lines, often in locations that focus on natural, plant-based treatments.

Some of these spas are located in larger cities like San Jose, California. Still, the use of microgreens in skincare is becoming more widespread.

SHOP NOW

Or you could make your own at home (*See the DIY Microgreen Face Mask Recipe*).

DIY enthusiasts can also create their own microgreen face masks using ingredients like borage microgreens and honey, which are soothing and hydrating due to their anti-inflammatory and antibacterial properties.

The Science Behind the Green

Now, I'm not just making this stuff up. Science backs it up.

A study published in the Journal of Agricultural and Food Chemistry found that microgreens contain significantly higher concentrations of phytochemicals and minerals compared to their mature counterparts (Xiao et al., 2012).

These phytochemicals, like carotenoids and polyphenols, are known for their antioxidant and anti-inflammatory properties.

They help protect your skin from environmental stressors and can even help repair existing damage.

But Here's the Thing...

While microgreens are amazing for your skin, they're not a magic bullet.

They work best as part of a holistic approach to skin health that includes a balanced diet, proper hydration, and a good skincare routine.

And let's be real - not all microgreens are created equal.

The nutrient content can vary depending on factors like growing conditions and harvest time.

That's why it's important to source your microgreens from reputable growers or, better yet, grow them yourself!

The Microgreen Challenge

So, here's my challenge to you: *Try incorporating microgreens into your diet for just two to four weeks.*

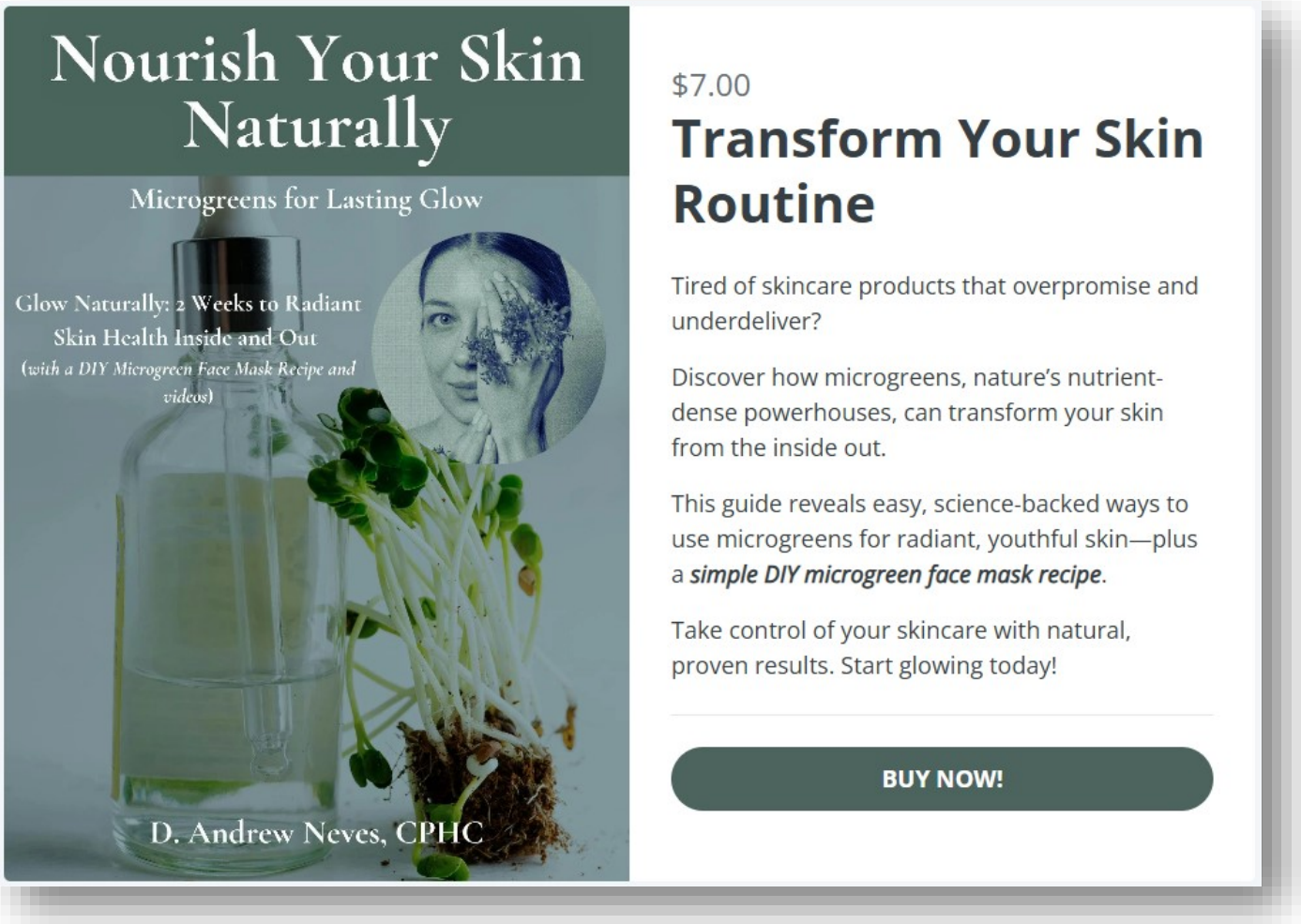
Keep a skin journal and note any changes you see. You might be surprised at the results.

Remember, good skin health is a journey, not a destination.

It takes time, consistency, and a willingness to try new things.

But with microgreens in your arsenal, you're already ahead of the game.

Want to dive deeper into the world of microgreens and skin health?



I've put together a comprehensive guide that covers everything from the best microgreens for specific skin concerns to easy recipes that'll make you look forward to eating your greens.

It's packed with scientifically backed information and practical tips to help you achieve your best skin yet.

Your skin deserves the best. Why not give it a little green boost?

Research

Dinkova-Kostova, A. T., Fahey, J. W., Wade, K. L., Jenkins, S. N., Shapiro, T. A., Fuchs, E. J., Kerns, M. L., & Talalay, P. (2007). Induction of the Phase 2 Response in Mouse and Human Skin by Sulforaphane-containing Broccoli Sprout Extracts. Cancer Epidemiology, Biomarkers & Prevention, 16(4), 847–851. https://doi.org/10.1158/1055-9965.epi-06-0934

Pullar, J. M., Carr, A. C., & Vissers, M. C. M. (2017). The Roles of Vitamin C in Skin Health. Nutrients, 9(8), 866. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5579659/

Xiao, Zhenlei, et al. "Assessment of Vitamin and Carotenoid Concentrations of Emerging Food Products: Edible Microgreens." Journal of Agricultural and Food Chemistry, vol. 60, no. 31, 30 July 2012, pp. 7644–7651, pubs.acs.org/doi/abs/10.1021/jf300459b, https://doi.org/10.1021/jf300459b.

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After years of cultivating microgreens, I compiled my knowledge into a comprehensive beginner's guide titled "**Children of the Soil**."

Transform Your Home into a Nutrient-Packed Superfood Haven

Your 9-Day Blueprint to Microgreen Mastery

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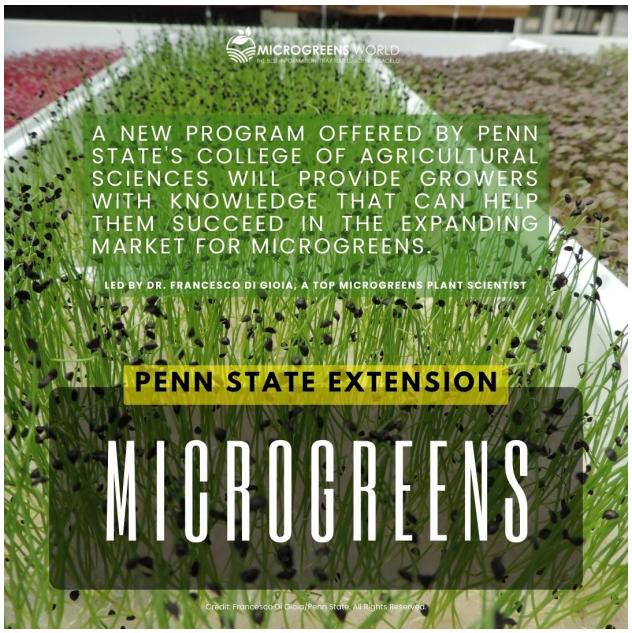
Cultivation Techniques

A Must For All Established and Aspiring Microgreens Growers: Penn State's New Project for Farming Success



Penn State's College of Agricultural Sciences has launched a new project to support microgreens producers with risk management education.

Funded by the USDA, the program aims to help established and aspiring growers tackle challenges in microgreen production, such as maintaining quality, ensuring food safety, managing disease, financing, and finding reliable markets.

The project will feature monthly webinars covering production issues, marketing, business planning, food safety, and legal aspects, along with two local workshops for hands-on training.

The initiative is unique in its comprehensive approach, addressing not only production issues but also business planning, marketing, and legal considerations.

The educational series begins on October 24 with a free webinar exploring the commercial and nutritional value of microgreens.

This program has significant implications for microgreens growers.

They get essential risk management strategies for a competitive sector and diversify their operations to meet growing market demands.

When: October 24, 2024 (12:00 PM-1:00 PM ET)

Registration deadline: October 23, 2024, 11:45 p.m.

About The Live Webinar

Led by Francesco Di Gioia, Associate Professor of Vegetable Crop Science at Penn State, this session is the first in a series designed to help agricultural producers navigate the complexities of microgreens production.

Participants will explore essential topics, including defining microgreens quality, maintaining consistency in commercial standards, and managing nutritional aspects alongside market strategies.

With the growing demand for microgreens due to their health benefits and potential as nutraceutical products, Dr. Di Gioia will also address the opportunities and risks associated with making nutritional claims.

Don't miss this opportunity to deepen your knowledge of microgreens production!

REGISTER

Source: Penn State. (2024, October 8). New project to support microgreens producers with risk management education. *Penn State News*. https://www.psu.edu/news/agricultural-sciences/story/new-project-support-microgreens-producers-risk-management-education

Emerging Industry News

Indoor vertical gardens are big energy consumers

The study was conducted by researchers from Marche Polytechnic University and the University of South Australia and examined the energy consumption of domestic indoor vertical gardens.

While these systems offer benefits like year-round local produce with zero food miles, they have significant energy demands.

Artificial lighting accounted for over 50% of total energy costs in growing red lettuce, which is five times higher than professional vertical farming setups.

Ventilation and irrigation systems consumed 18% and 9% of power costs, respectively.

The researchers used smart meters to measure the real-time electricity usage of a commercial home cultivator.

The study highlights opportunities to improve energy efficiency in domestic indoor vertical gardens.

Suggested improvements include switching to LED lighting, enhancing ventilation efficiency, and improving appliance design.

The researchers also propose adopting energy labeling similar to other household appliances to help consumers make informed decisions.

For growers, this implies that while indoor vertical gardens offer benefits, their high energy consumption needs to be carefully considered.

Improvements in technology and design are needed to make these systems more sustainable and economically viable for home use.

Growers should weigh the benefits against energy costs and consider future improvements in efficiency when deciding to invest in these systems.

Source: Brunetti, G., Duca, D., Boakye-Yiadom, K. A., Deligios, P. A., Appicciutoli, M., Costantino Vischetti, Garofalo, C., Riolo, P., Bernardi, A. D., Marini, E., Milanovic, V., Abulebda Abdalhadi M A, Alessio Ilari, Francioni, M., Casucci, C., Enzo Lombi, Tagliabue, F., Rossa, U. B., Pedretti, E. F., & Ledda, L. (2024). Sustainable Domestic Vertical Farming: Energy Consumption of an Indoor Farming Appliance. 53, 122–127. *2024 IEEE International Workshop on Metrology for Living Environment (MetroLivEnv)* https://doi.org/10.1109/metrolivenv60384.2024.10615743

Commercial Best Practices

Microgreens: Elma Farm's Nutrient-Dense, Farm-to-Door Secret

Grays Green Farm, a local farm in Elma, Washington, specializes in growing and delivering microgreens.

The farm is owned and operated by Tara Newman, who started it in 2021 shortly after moving to Grays Harbor.

The farm focuses on sustainable and organic growing practices, producing nutrient-dense microgreens that are delivered fresh to customers' doorsteps.

Key takeaways for aspiring growers:

1. Sustainable farming practices, such as no-till methods and organic compost application, are crucial for soil health and plant quality.
2. Direct-to-consumer delivery can ensure freshness and build relationships with customers.
3. Offering subscription plans and one-off deliveries provides flexibility for customers.
4. Diversifying crop offerings can help meet various customer needs and preferences.

The farm uses better-than-organic growing practices, focusing on soil health through methods like no-till farming, organic compost application, and cover cropping.

This approach supports healthy plants that are more resistant to

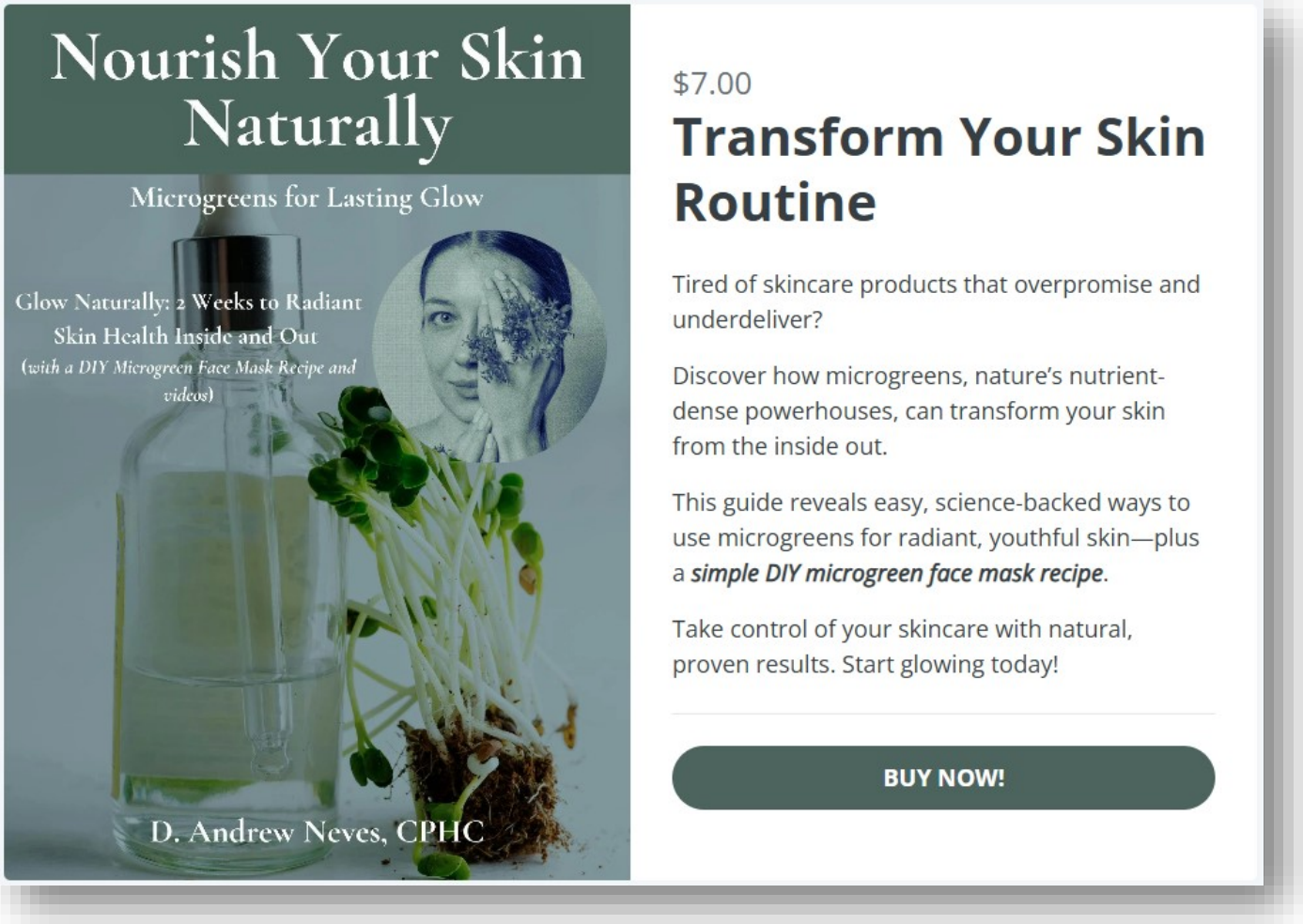
pests and more nutritious for consumers.

Grays Green Farm offers a wide variety of produce beyond microgreens, including tomatoes, peppers, leafy greens, and berries.

The farm is not open to the public.

However, customers can arrange for pickup if they are outside the delivery area.

Source: Lotz, K. (2024, June 19). Local farm growing microgreens in Elma. *GraysHarborTalk*. https://www.graysharbortalk.com/2024/06/19/local-farm-growing-microgreens-in-elma/



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