



GeoAg Virtual Conference May 23, 2023
“A Microgreen Revolution with Rocks”

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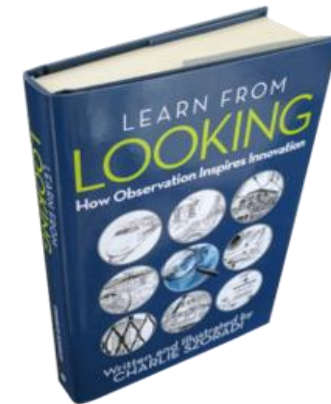
The Agrarian Group
Agricultural Technologies for a Growing Planet

President



GREENandSAVE.com
Saving Your Money and the Planet!

Founder & Editor
since 2007



Author of the book
on sustainable design:
LEARNfromLOOKING.com

The Future of Food can be:

**FRESH
LOCAL
HEALTHY
AFFORDABLE
and
SUSTAINABLE**



Problem to Solve
RESEARCH:

Unhealthy America

Obesity in the US:

19.7% children & adolescents

41.9% adults

source: www.cdc.gov/obesity/data/childhood.html +
www.cdc.gov/obesity/data/adult.html



Problem to Solve
RESEARCH:

Long Distance from Farm to Table

90% of U.S. lettuce
comes from California
and Arizona

source: www.lettuceinfo.org/lettuce-safety + www.aic.ucdavis.edu/profiles/lettuce-2005.pdf



Problem to Solve
RESEARCH:

Nutrient Loss

46% loss of key nutrients for
vegetables like lettuce within 7
days of cold storage / transit

source: [www.vegetory.com.my/single-post/2020/04/19/
nutrient-loss-in-vegetables-after-storage](http://www.vegetory.com.my/single-post/2020/04/19/nutrient-loss-in-vegetables-after-storage)



Problem to Solve
RESEARCH:

Climate Change

24% of Greenhouse Gas Emissions (GHG) comes mostly from Agriculture (cultivation of crops & livestock) and deforestation.

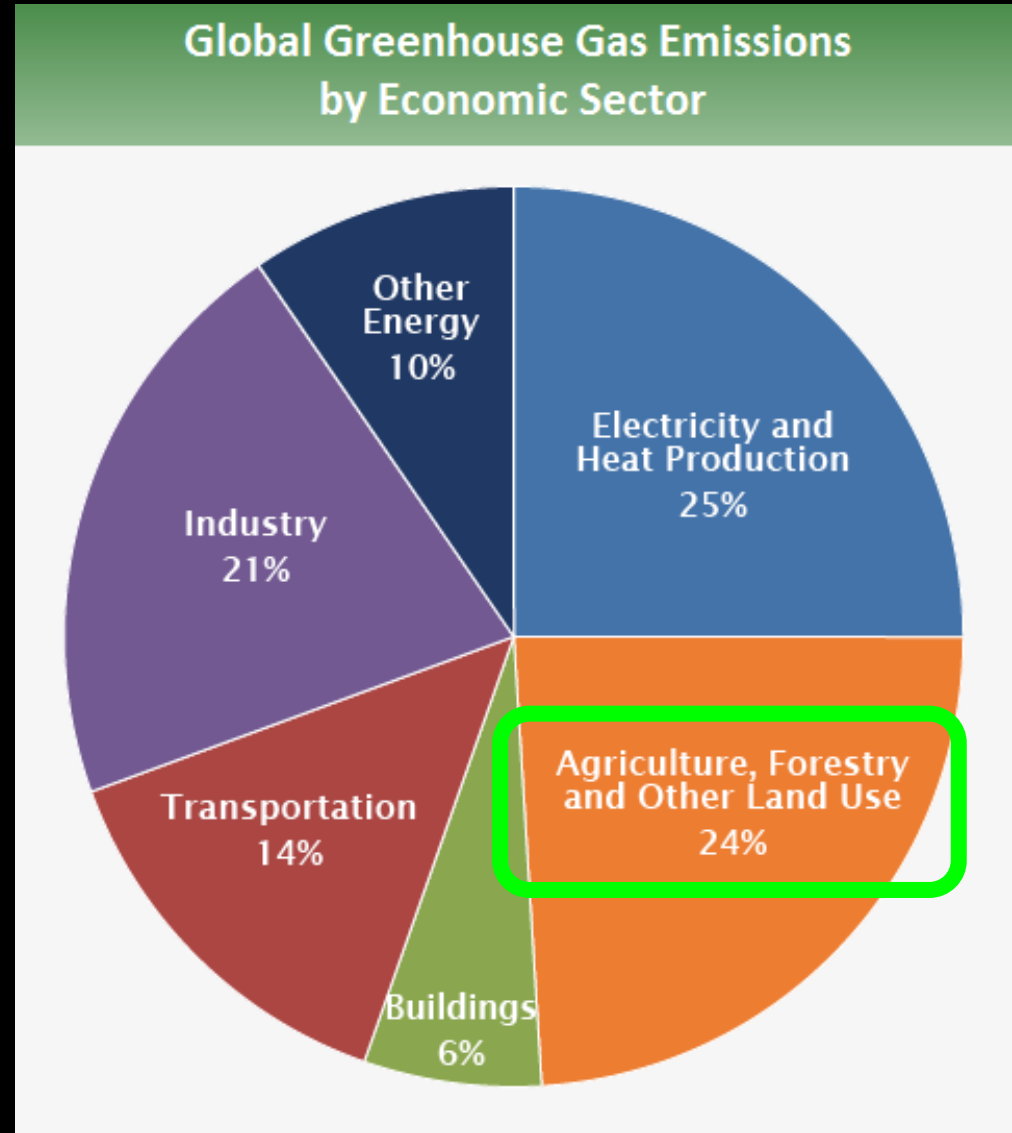
source: <https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data>



Problem to Solve
RESEARCH:

If you only remember one thing,
remember this:

**Production of food
contributes more to
Climate Change than
the cars we drive.**



source: <https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data>



Opportunity
RESEARCH:

Local Indoor Vertical Farming

2 key advantages over traditional outdoor field farming:

10 to 20 times more yield / acre

70% to 90% less water

source: US Department of Agriculture + www.theguardian.com/environment/2022/aug/17/indoor-vertical-farms-agriculture

Home Grown Microgreens in Rocks

FUTURE
FOOD RIGHT
NOW

Affordable,
Fast,
Easy,
and
Nutritious

Rocks reduce
the cost of Grow
Mats for each
weekly harvest

MICROGREEN SUPERFOOD



Home Grown Microgreens

FUTURE
FOOD RIGHT
NOW

**Affordable,
Fast,
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**Rocks reduce
the cost of Grow
Mats for each
weekly harvest**



Superfood Benefits of this Microgreen **“BAT” MIX:**

Broccoli – Heart Health, Digestion, Immune System, and Cancer Prevention.

Arugula – Sports Performance, Blood Pressure Reduction, Cancer Prevention, Vision Protection, Wound Healing, Liver Detoxification, and Prevention of Bad Breath and Body Odor.

Turnip – Healthy Skin and Hair, Reducing Anemia, Osteoporosis Prevention, Cancer and Diabetes Prevention and Treatment, and improved Digestion, Sleep, Mood, and Sun-damaged skin.



Why Now

**The human population of earth
has more than doubled in 50 years**
(from under 4 billion to almost 8 billion)

**We need to encourage home growing in
underserved communities and in every home.**

**Growing in Rocks is a Cost-Effective
+ SUSTAINABLE solution!**

Cost Summary

Microgreens grown in Rocks over Sand eliminates the cost of Grow Mats, which are a larger cost than seeds.

This brings the cost per lb of microgreens to just \$1.26/lb, which is lower than spinach and other nutritious leafy greens. (Details in Appendix)

APPENDIX

The following pages include instructions for a Microgreen Starter Kit where the grow mat can be replaced with rocks

+

Photographs of Microgreens
growing in Rocks
and
Financial Analysis

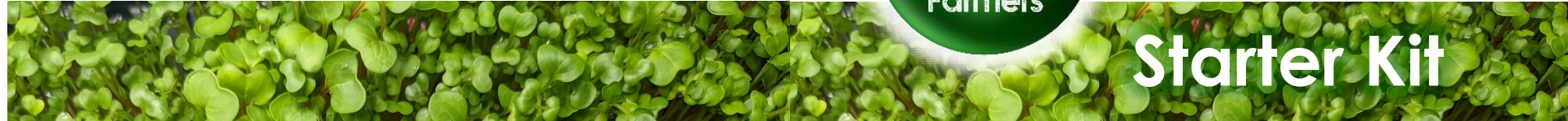
Student Farmers is a non-profit organization dedicated to in-home sustainable farming for students of all ages, who seek to improve their health, reduce cost of vegetables, and promote environmental stewardship.

Welcome to the Future of Food!



**MICROGREEN
SUPERFOOD**

Starter Kit



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Broccoli – Heart Health, Digestion, Immune System, and Cancer Prevention.

Arugula – Sports Performance, Blood Pressure Reduction, Cancer Prevention, Vision Protection, Wound Healing, Liver Detoxification, and Prevention of Bad Breath and Body Odor.

Turnip – Healthy Skin and Hair, Reducing Anemia, Osteoporosis Prevention, Cancer and Diabetes Prevention and Treatment, and improved Digestion, Sleep, Mood, and Sun-damaged skin.

Medical Disclaimer: The content here, online at StudentFarmers.org, or on any of the social media posts is for informational or educational purposes only, and it does not substitute professional medical advice or consultations with healthcare professionals.
See: StudentFarmers.com/microgreen-benefits.



This kit includes: 1. Four Envelopes of Seeds, 2. Four Grow Mats, 3. One Grow Tray (with drainage holes), 4. One Upper Tray (without holes), 5. One Lower Tray (without holes), 6. Spray Bottle



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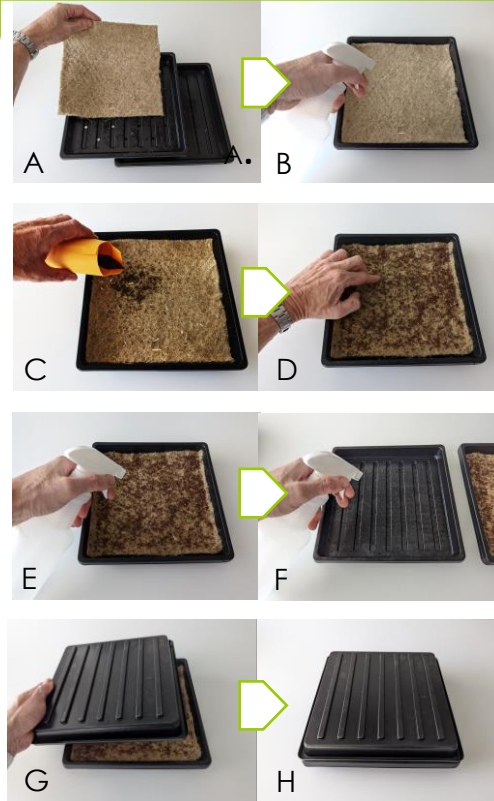


For “how to” video, FAQs, tips, recipes, and supply SHOP for more seeds and grow mats, scan the QR code or visit www.StudentFarmers.com/StarterKit

STEPS FOR SUCCESS

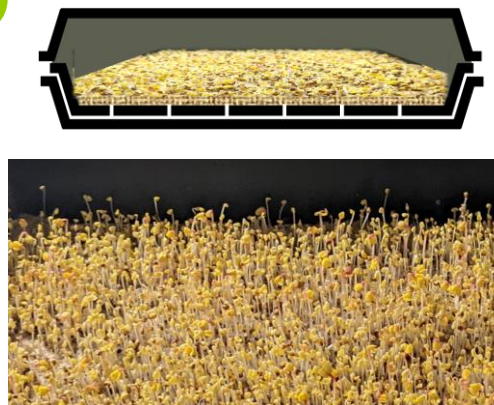
DAY 1

- A.** Lay a sheet of the Grow Mat in the Grow Tray (with drainage holes) and set in Lower Tray (without holes).
- B.** Spray to wet the mat.
- C.** Spread seeds evenly on the mat using the seed envelope.
- D.** Even out the seeds with your finger.
- E.** Spray to wet the seeds.
- F.** Spray to wet the inside of the Upper Tray "lid".
- G.** Cover the lid for germination.
- H.** Set in a cool place away from direct sunlight.



DAYS 2 & 3

Spray the seeds on the mat twice a day, as well as the underside of the lid. Keep the lid covered. The growth should come out by the end of day 2. By day 3 they should measure about 1".



DAYS 4 to 9

The growth should be about 1.5" on day 4. Remove the lid. Move the tray to a windowsill or table near a window. Spray or add 6 oz to 8 oz of water twice a day. Pouring is faster than spraying.

A-1: Pour the water evenly over the top

OR

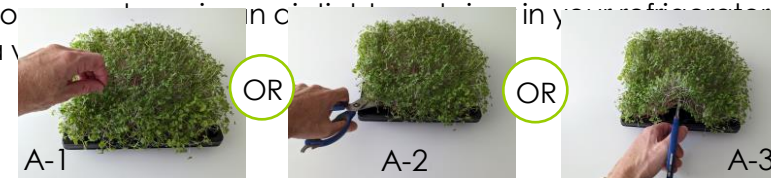
A-2: Pour the water into the lower tray. When the greens are 3" to 4" tall, they are ready to harvest.



DAY 10

Three easy ways to Harvest:

A-1: Pull out the greens and eat them with their tiny roots, **A-2:** Cut then above the Grow Mat, **A-3:** Cut the Grow Mat to place on a dish on your table. You can also use them in your finger food for a party.



Compost or discard Grow Mats, which are biodegradable.

Eat & Repeat !

Enjoy your microgreens on salads, sandwiches, in smoothies, and more: www.StudentFarmers.com/Recipes

THE SET UP:

Repurposed
Plastic
Single Use
Water Bottle
+
Sand*
Pea Gravel*
Microgreen Seeds
Water

*Materials
sourced from
Hardware Store



GERMINATION:

**Three Days
in darkness**

**This photo is
day 2**



VEGETATION:

7 Days
in natural light or
with “grow” lights

This photo is day
3 of Vegetation



VEGETATION:

7 Days
in natural light or
with “grow” lights

This photo is day
5 of Vegetation,
two days before
“harvest”



THE SET UP:

3 Trays (10" x 10")
with equal Seeds
and Water

#1: Grow Mat*

#2: Grow Mat
over Pea Gravel

#3: Pea Gravel
over Sand

*Grow mats are
typically hemp or
jute, used for
each grow cycle
then composted.



GERMINATION:

Three Days
in darkness

This photo is
day 2



GERMINATION:

Three Days
in darkness

This photo is
day 3

Note:
Germination with
Pea Gravel over
Sand needs an
extra day
because the
seeds are in the
cavities of the
rocks



VEGETATION:

7 Days
in natural light or
with “grow” lights

This photo is day
3 of Vegetation



VEGETATION:

7 Days
in natural light or
with “grow” lights

This photo is day
4 of Vegetation
with a look into
the root growth
of the test with a
grow mat over
the pea gravel



COMPARISON:

3 Trays with
equal Seeds and
Water

#1: Grow Mat
#2: Grow Mat
over Pea Gravel
#3: Pea Gravel
over Sand

Note: #2 and #3
look taller
because the Pea
Gravel adds
about $\frac{3}{4}$ "





COMPARISON:

#1: Grow Mat

#2: Grow Mat over Pea Gravel

#3: Pea Gravel over Sand

Note: #2 and #3 look taller because the Pea Gravel adds about $\frac{3}{4}$ "

HARVEST:

Each of the three 10"x10" trays produced approximately the same weight of cut microgreens: 6 oz over 10 days



CONCLUSION:

Pea Gravel over Sand saves the cost of the Grow Mat for each grow cycle and helps bring the cost of microgreen superfood in line with spinach and other nutrient rich leafy greens.

Financial Analysis

MICROGREENS in ROCKS

Cost Benefit Analysis

Production Comparison for Highly Nutritious Leafy Greens					
SPINACH			Length of Grow Time (seed to Harvest)	Water needed for Hydroponics Growth	Water needed for Field Growth
Retail Cost of Organic Spinach per lb	\$6.84				
76.9 million lbs sold in 2021 (organic 50% of total) Source 1					
In 2023, the approximate price range for non-organic US Spinach was between \$1.31 and \$1.37 per pound (lb). Source 2	\$1.31				
Target Wholesale Cost to beat / lb	\$1.31	6 weeks (42 days)	1 Gallon	10 to 20 Gallons	
MICROGREENS using Retail Seeds and Grow Mats			Length of Grow Time (seed to Harvest)	Water needed for Hydroponics Growth	Water needed for Field Growth
Recurring Costs to Produce 1 lb					
Seed Cost Retail (1.5 oz)	\$ 1.50				
Grow Mat Cost (10"x10" x 3)	\$ 2.40				
Water (1 gallon)	\$ 0.01				
Total cost per 1 lb	\$ 3.91	1.42 weeks (10 days)	1 Gallon: 128 oz/10 days. 12 oz per day	N/A	
MICROGREENS using Wholesale Seeds and Rocks			Length of Grow Time (seed to Harvest)	Water needed for Hydroponics Growth	Water needed for Field Growth
Recurring Costs to Produce 1 lb					
Seed Cost Wholesale (1.5 oz) - 30% lower than retail	\$ 1.05				
Grow Mat Cost (10"x10" x 3)	\$ -				
Pea Gravel (rinsing rocks for next grow cycle and new sand as needed)	\$0.20				
Water (1 gallon)	\$ 0.01				
Total Cost per 1 lb	\$ 1.26	1.42 weeks (10 days)	1 Gallon: 128 oz/10 days. 12 oz per day	N/A	
Source 1: https://www.thepacker.com/news/organic/organic-spinach-big-part-overall-retail-spinach-category#:~:text=With%2076.9%20million%20pounds%20sold,saA18:F18les%20in%202021%2C%20IRI%20said.					
Source 2: https://www.selinawamucii.com/insights/prices/united-states-of-america/spinach/#:~:text=US%20spinach%20wholesale%20price,1.37%20per%20pound(lb).					