Resiliency **Preparedness** Recovery The GeoAg **National Priorities** Perspectives

Presented April 14, 2020

by

Academic Association of Geological Agriculture Research (AAGAR)

About Academic Association of Geological Agriculture Research (AAGAR)

- About Academic Association of Geological Agriculture Research (AAGAR)
- Geological Agriculture (GeoAg) is the new study of cultivating vegetation in geological formations without soil and fertilizers.
- The book River Stones Grow Plants by Richard Campbell, MBA, with contributions from Dr. Arvazena Clardy (Tennessee State University) and Dr. Henry Teng (George Washington University) outlines the history and evolution of geological agriculture.
- Campbell, in collaboration with 32 domestic and international universities, has invested over 10 years and created the management consulting firm, To Soil Less to integrate GeoAg related sciences into academic institutions.
- The AAGAR is comprised of 9 institutions of higher learning where faculty are engaged in investigating the theories of GeoAg through the lens of diverse areas of science, via on-campus research and grants. Each institution has a GeoAg research grant in development with the USDA, USAID and NIH (define all abbreviations).
- Over \$5 million in federal grant research has been submitted in 2020 from 5 AAGAR institutions thus far.
- See list of the 9 domestic institutions, 20 faculty members and their related GeoAg Integrated Research Area for each scientist.

All images in this document consist of plants grown by means of GeoAg methodologies and theories.

AAGAR – Executive Committee

Chair – Dr. Arvazena Clardy, Tennessee State University Vice Chair – Dr. Oulare Owolabi, Morgan State University Secretary – Dr. Carollyn Boykins, Tennessee State University Founder – Richard Campbell, To Soil Less Consulting

Tennessee State University Dr. Arvazena Clardy GeoAg Horticulture Plants Dr. Carollyn Boykins GeoAg Livestock Feed Dr. Elbert Myles GeoAg Cancer Research

Clark Atlanta University Dr. Shonda Lawrence GeoAg Societal Implications Dr. Eric Mintz GeoAg Chemistry Professor Donald Hylton GeoAg Bioplastics

Medgar Evers College/CUNY Dr. Dereck Skeete GeoAg Urban Environment Fort Valley State University Dr. Biswas Bipul GeoAg Field Crops Dr. Steven Samuels GeoAg Greenhouse Crops

Delaware State University Dr. Michael Casson GeoAg Markets, Trade and Economy Dr. Constant Beugre GeoAg Business

> Morehouse School of Medicine Dr. Brian Rivers GeoAg Cancer

Savannah State University Dr. Sue Ebanks GeoAg Environmental Science

Morgan State University Dr. Oulare Owolabi GeoAg Engineering Dr. Jiangnan Peng GeoAg Chemistry Professor Author Willoughby GeoAg Aerospace

Bronx Community College/CUNY Professor Charmaine Aleong GeoAg Urban Nutrition Dr. Charles Maliti GeoAg Human Health Dr. Dickens St. Hilaire GeoAg Soil Health Professor Sami Segni GeoAg Geology

Historic Perspective on COVID-19

• As of April 10, 2020, over 17,000 Americans have died of the COVID-19 virus.

Pandemic History

- Death Potential History has demonstrated that some viruses like the Asian Flu which killed over 1 million people in 1957 and the Spanish Flu of 1918 that produced a death toll of over 50 million people, can cause severe fatality levels.
- Pandemic Timeline -Previously, virtually all major pandemics have lasted more than one year.
- Current Expectations With modern communication and science we have been able to arrest those numbers so far, but a mutating airborne community virus like COVID-19 could keep individuals homebound for a year in an attempt to avoid millions of deaths from the virus.



https://www.history.com/topics/ middle-ages/pandemics-timeline

Perspectives of our Preparedness for COVID-19

1. Basic Evaluation of Preparedness of Life Necessities

- 1. Healthcare Death rates are reported daily, while the plight of the overburdened health care system is also regularly recounted. We recognize the global impact and trust that health professionals will receive the supplies and personal protection required for their patients and themselves. Healthcare systems were not prepared, but leaders and stakeholders appear to be working toward solutions that will reduce the upheaval of the pandemic.
- 2. Utilities Utility companies utilize extensive automation, requiring limited human intervention, so the lights and water should see relatively little disturbance. *The utility community appears to have been better prepared for home demands.*
- 3. Housing The government has put several policies in place to assure that current living locations for individuals will remain, but it has offered only a temporary fix. Furthermore, most people lack the tools for long term shelter in place requirements. *People are not prepared to shelter in place for extended periods.*
- 4. Communications Smart TVs and phones, as well as the internet are maintaining their systems allowing people to communicate, work, socialize and engage others. *The communication community was prepared and has adjusted to increased usage.*
- 5. Food Food access will become problematic as grocery stores currently are experiencing limits and for many, specific foods and commodities are already scarce. *Grocery Stores were not prepared, and it will be challenging for them to catch and keep up.*
- Short-term issue 1 The supply chain is challenged throughout the system from the farm, manufacturing and
 processing, to trucking and warehousing, and ultimately the grocery store. The supply chain will likely face ongoing
 disruptions.
- 3. Short term issue 2 When trucks with inventory arrive at grocery stores, it is unlikely they can meet all immediate demands as listservs are currently being generated showing where the next toilet paper delivery will occur.
- 4. Midterm issue 1 (3 to 6 months) With compromised grocery store inventory, and limited availability of key items, death by starvation is a possibility for many, especially within marginalized populations.
- 5. Midterm issue 2 (6 to 12 months) Potential high amounts of extreme food insecurity and starvation.
 - Economy The economy has fallen but was high at the time the pandemic started, where financial reserves were at an all-time high. The economy was better prepared to cover the anticipated costs of the quarantine.
- 6. NET RECOMMENDATION Focus on decentralized food systems and protective home gear to keep people alive.

Perspectives on the National Priorities

- **Resiliency** Home resiliency is the ability to survive and thrive at home without the need for much outside interface. Households should be equipped with the tools to survive at home with proper access to utilities, communications (internet and TV), commerce and school opportunity and food access.
- Preparedness It is important to prepare for a long-term home quarantine paradigm by focusing on making each home a self-sustaining living ecosystem.
- **Recovery** The recovery process will begin when the air clears up and the governments open up their economies.

Perspectives on GeoAg Home Resiliency

The key action in home resiliency is providing permanent food access. During times of home quarantine, there are two options: 1) Grow at Home or 2) Deliver to Home

Grow at Home - AAGAR recommends that people learn and apply the science and theories of GeoAg to grow at home indoors or outdoors. The plant images on this page are examples of what rocks can grow for people in homes.

Key GeoAg benefits include:

- 1. No soil and fertilizer use
- 2. Permanent growing medium
- 3. High nutritional value foods
- 4. Indoor and outdoor use
- 5. Low cost reliable food growing system

6. Approximately, two 40 lbs. bags per person can sustain long term daily food needs.

Additionally, available soil systems are encouraged and can be utilized in tandem with GeoAg systems to improve production and increase food access.



Perspectives on GeoAg Home Resiliency

How Does GeoAg Help in A Pandemic?

As grocery store inventory becomes restricted and money limited, access to food can decrease. GeoAg teaches people how to grow at home permanently using rocks.

GeoAg training webinars show how to grow all the plants listed indoors at home within 30days using regular 75-watt lights.

GeoAg provides home quarantine residents access to a sustainable, low cost, high nutritional value food program suited to indoor and outdoor use.

GeoAg teaches how to successfully and efficiently grow and eat at home during a global pandemic and beyond.

What you Need to Know

- 1) How to grow 30 plants in rocks indoors.
- How well your local rocks perform. (your rocks' performance will be tested).
- 3) How to test the nutritional value of rocks.
- 4) How to test the nutritional value of the plants grown in rocks at home.
- 5) How and when to eat what you grow.

GeoAg Webinar Topics

-) Getting Started: GeoAg Supplies
- 2) Setting up your home micro-farm
- 3) Seeding your micro-farm
- 4) What to Eat in 1 week
- 5) How to test your rock nutritional value
- 6) What to Eat in week 2
- 7) What to Eat in week 3
- 8) How to recycle and repeat
- 9) How to test your plant value
- 10) Managing your GeoAg table farm

Goal 1: Learn GeoAg At Home Online. Education of growing plants in rocks at home is best achieved using online formats. Online videos show the ABCs of GeoAg. There are five key points emphasized over 10 webinars. Additionally, the 15 direct benefits of GeoAg are outlined. One main goal is to become educated on using rocks at home to grow food independently.

What are the direct benefits of GeoAg?

- 1. High Nutritional Value
- 2. Low Maintenance
- 3. Reduced Weeding
- 4. No Fertilizer
- 5. No Soil Use
- 6. Less Watering
- 7. Adaptive to Many Environments
- 8. Lasts a Lifetime
- 9. Sustainable
- 10. Attractive
- 11. Profitable
- 12. Grows Many Types of Plants
- 13. Recycles Plastic
- 14. Indoor and Outdoor Use
- 15. Drought Resistant

Perspectives on GeoAg Home Resiliency

Goal 2: Hosting &

Delivering.

Whomever is interested in educating their populations should host GeoAg Webinars on their websites so their followers have access to the basic knowledge of the use of rock wherever they live. The next part is generally the responsibility of your municipal leaders or institutions, but anyone can facilitate the delivery of GeoAg home supplies. If people have to shelter in place, then GeoAg would need supplies to be delivered.

The Supplies

Tested rocks, sand, seed, fabric, lights, plastic containers, tacks, trellis systems, drip trays and a book. Yep, standard household items for many.

Hosting GeoAg Webinars

- 1) Samples Rocks composition differ by geographic location. Therefore, we need samples of the rocks available at retail in your city.
- Performance Testing We need to video the rock plant performance of the rocks from your city over 30 days.
- **3) Deliverable** We provide you 10 rock specific webinars of 30 plant types growing in rocks from your location.
- 4) Rock Testing During the 30 day rock performance testing and videotaping, we send rock samples to the university labs to identify nutrient output values of the specific rocks.
- 5) Plant Testing We send samples of the plants grown in your rock to the university lab to determine the nutrient composition of the plants grown in rocks from your area.
- 6) Local Video and webinar shot using local rocks include local references for whomever is sponsoring the webinar for your location and where to source local rocks, seeds and supplies.
- 7) Go Live Webinars live on website and available to populations.

Delivery of GeoAg Supplies

There are several options for getting the appropriate supplies to populations:

- You Are Lucky Many live in places where they can go outside and pick up available rocks from driveways, landscape or the stream in their neighborhoods. The videos show you how to use these.
- 2. Hardware Store We teach you to go to the hardware store to get supplies. But what if they are closed or you don't live near one?
- 3. Government The best case scenario is that your State, City, County or Town set up services to deliver tested GeoAg supplies to your home in the same fashion as trucks are sent to pick up your trash every week. Governments have the ability to feed thousands at one time by hosting GeoAg webinars and setting up home delivery protocols.
- Universities Like governments, universities are responsible for large populations. They too can set up rock and GeoAg supply pick up and delivery services for students.
- 5. Companies Same. Companies can pay the cost and feed their people.

Perspectives on GeoAg Home Resiliency

When it comes to rocks, plant behavior indoors is very different than plant behavior outdoors.

Outdoors, the bees, sun, worms and pollen play a role in the organic interface of nature with the rocks and plants. Consequently, plants tend to grow to full term.

Indoors, the lack of sun, bees and worms reduce the ability for complex plants to mature. We have been growing in rocks for over 25-years and have developed a list of 10-plants which have high nutritional value and grow well in rocks indoors to edible state within 30-days.

10 Nutritious Plants that Grow in Rocks Indoors to maturity.

Microgreens and Sprouts (ready to eat in 7 to 10 days)

- 1. Broccoli Sprouts
- 2. Sunflower Microgreens
- 3. Wheatgrass
- 4. Pea Shoots Microgreens
- 5. Alfalfa Sprouts

Common Crops

(ready to eat in 4 to 6 weeks)

- 1. Bean varieties
- 2. Pea varieties
- 3. Lettuce varieties

Spices

(ready to eat in 4 to 6 weeks)

- 1. Cilantro
- 2. Parsley



Perspectives on GeoAg Preparedness

Goal – Learn how to use rocks to grow indoors and <u>outdoors</u> at home by September2020 when the sun goes down and when grocery stores issues may likely be more dire.

- 1. Knowledge GeoAg is simply a new way to use rocks. At issue is that individuals know little about plant grow in rocks. Plants grow differently in rocks than in soil. Teaching indoor GeoAg through online programming utilizing webinars is more accessible. Success with GeoAg indoor training can be achieved in as little as 60 days and can be repeated indefinitely. However, to teach and train on GeoAg outdoor behavior, a full season of GeoAg activity needs to be filmed, which takes the spring and summer seasons, occurring only once a year.
- 2. Not All Crops Grow Indoors Although GeoAg systems can grow 20 edible plants indoors at home to provide basic food and nutrition permanently, those plant types don't include tomatoes, cucumbers, squash, corn, okra and other common crops that tends to only mature outdoors.
- **3.** Outdoor GeoAg Crops Require Sunlight Similar to traditional farming outdoors, the planting season starts in April with plants beginning to mature in June to September depending on crop type.
- 4. Preparedness Means Spring and Summer Training The Spring and Summer season only happens once and year and is the foundation of the traditional outdoor growing season. Therefore, with GeoAg preparedness means to use a full agriculture season to properly learn how plants grow in rocks outdoors over a full season. With GeoAg, cucumbers, squash, potatoes, lettuce, tomatoes and all fruits can only grow outdoors where a full spring and summer season is needed.



Perspectives on GeoAg Preparedness

Critical Considerations

- 1. The COVID-19 virus is beginning to affect all aspects of life increasing the strain of food insecurity. By the fall of this year, the national food security issue could also be a national food insecurity crisis.
- 2. Indoors, GeoAg research can occur repeatedly and for education.al purposes every 60 days
- 3. However, a complete outdoor spring / summer season only happens once per year.
- 4. Should the nation not engage the GeoAg research team to take advantage of the spring and summer 2020 season to conduct outdoor research which could be available by this August 2020, it would take another year to provide similar research findings and recommendations for home use.
- 5. With respect to home self-sufficiency, not engaging the public by June, could significantly and adversely affect home food sustainability options. Food insecurity could add to the virus' mortality activity.
- 6. GeoAg cherry tomatoes are sweet and grow like grapes achieving a height of up to 16 feet in rocks, outdoors. This year, about 50 plants will be grown in a 1 square foot area producing over 1,000 cherry tomatoes. Approximately, 100 cherry tomatoes will fall and seed the GeoAg garden. If the temperature stays over 60 degree, after 4 months, new cherry tomato plants will grow. The following spring, cherry tomatoes will also return. With GeoAg, seed tomatoes once and they return annually without new seeding.



Perspectives on GeoAg Preparedness

Key Steps for GeoAg Fall/Winter Preparedness

- 1. Test local area rocks for nutritional output value
- 2. Actively video tape and host GeoAg webinars to teach people how to use the rocks around them to access food
- 3. Establish delivery systems to drop off rocks and seeds to people homes
- 4. Set up areas in the city for consumers' to pick up rock

Additional Elements of Preparedness for Long Term Shelter in Place

- **1. Gear** Provide consumers with pandemic grade home protection gear like we have ski gear.
 - 1. Engage fashion manufacturers to design full body suits for outdoor living in any pandemic; we are already seeing more fashionable masks, now combine the design with a ski suit but lightweight for summer use.
- 2. Food Alter the grocery store paradigm possibly going to full delivery Since postal workers deliver mail to every home and sanitation workers pick up trash from every home; it is reasonable to expect USDA/FDA, or other government agencies in conjunction with grocery stores to coordinate delivering food to every household.
- **3. Basics** Government to cover all consumer utility bills (water, internet and electricity)
- 4. **Employment** Provide additional subsidies for online business interface and technology to communicate via smartdevices (computers, tablets and phones). Most students have computer and the ability to use them. Additional product availability and training to ensure all adults can connect is warranted.

Perspectives on Recovery

- 1) Recovery discussions are currently occurring but additional knowledge of when and how the country will reopen needs to be addressed. Priorities need to be addressed as to which steps to take and a timeline for taking them. Without knowing how long the pandemic last and the full loss of life, and the mood of social engagement after the pandemic will better dictate the best way to recover.
- 2) In all cases, knowing how to use rocks for sustainment at home will be a critical skill.
- 3) When the recovery phase is entered, academic institutions investigating GeoAg disciplines of science, should be fully resourced to comprehensively explore geological materials for human sustainment to improve immunities and medical advances which GeoAg potentially offers



AAGAR Summary on National Priorities

- 1. The geological agriculture body of research is available to support national priorities.
- 2. A host of universities are ready and capable of mobilizing to take advantage of the spring and summer 2020 season to advance GeoAg research and developing online content to encourage home sustainability protocols.
- 3. Team AAGAR has grants in development with United States Department of Agriculture, National Institute of Health and United State Agency of International Development to assist, however award announcements are later in 2020 with the research scheduled to begin in 2021.
- 4. We recommend engaging AAGAR institutions to assist in national resiliency and preparedness until such time as GeoAg can be integrated into recovery efforts.

AAGAR CONTACT INFORMATION

AAGAR - CHAIR Arvazena Clardy, Ph.D.

Associate Professor of Horticulture and Extension Specialist

4-SET and NRCS Outreach Coordinator Department of Agricultural and Environmental Sciences College of Agriculture

Tennessee State University 3500 John A. Merritt Boulevard Nashville, TN 37209 615-963-4887 aclardy@tnstate.edu

AAGAR – VICE CHAIR

Oludare Owolabi, D. Sc., P.E. Assistant Director of the Center for Advanced Transportation and Infrastructure Engineering Research (CATIER) as well as the Director of the Undergraduate Geotechnical Laboratory Department of Civil Engineering

Morgan State University 1700 East Cold Spring Lane Baltimore, Maryland 21251 443-885-5445 <u>Oludare.owolabi@morgan.edu</u>

AAGAR - FOUNDER

Richard Campbell President of To Soil Less Founder of Geological Agriculture

To Soil Less <u>www.tosoilless.com</u> Ellicott City, MD 202-689-9096 <u>richardcampbell2010@gmail.com</u>