ECOLOGY ACTION'S
GARDEN COMPANION

GROW BIOINTENSIVE® News from Around the World

image: dan royer-miller

FALL 2024

IN THIS ISSUE:

The Jeavons Center Mini-Farm Report

By John Jeavons, Ecology Action Executive Director

As autumn approaches, and we begin to bring in the harvest at The Jeavons Center, my mind turns to celebrating another kind of fruition: the one that comes from the global GROW BIOINTENSIVE movement, of the work we and our international partners are doing to "*Teach people worldwide to better feed themselves while building and preserving the soil and conserving resources.*"

This fall, I'm thinking about the progress being made in GB Teacher Certification in Africa, the result of cross-pollination between our African and Latin American partners, G-BIACK and ECOPOL/El Mezquite last November.

Africa is a continent made up of 54-58 countries with over 1 billion people of diverse cultures and soils, and an abundance of natural resources. However, food insecurity and malnutrition are widespread, with 1 in 5 Africans facing hunger in 2023—almost double the global average. The most vulnerable Africans often live on the margins, with access only to small pieces of land with low fertility. GROW BIOINTENSIVE can greatly assist these people in building up soil quality and producing more healthy food to eat. And it is: through the dedicated work of our partner organizations, we estimate that millions of farmers across Africa have been exposed to GB. But after many decades, there were no certified GB teachers in Africa.

Meanwhile, across Latin America, the Caribbean, and Europe, Juan Manuel Martínez, Agustín Medina, and Marisol Tenorio Lopez have had astonishing success teaching and certifying hundreds of GB Teachers through their non-profit ECOPOL/El Mezquite. The certification worshops that Marisol and Agustín give in Mexico and other countries adhere to the guidelines of Ecology Action's Self-Teaching Mini-Series Booklet 30, and are similar to what is done by Ecology Action in California, with one key difference: before the 5-day Certification workshop, in a program they call *Learning Circles*, Marisol regularly meets on Zoom with teacher candidates to answer questions, discuss challenges, and ensure that they have read *How to Grow More Vegetables* and have assimilated the fundamental elements of GB. This strategy has been so successful that Certified Basic-Level GB teachers who are candidates for Intermediate-Level certification support the process for the next group of Basic-Level candidates in a program called *Learning Circles II*. More certified teachers help spread GB quickly—and with high quality—across a region.

Seeing the teacher certification gap in Africa, Juan Manuel, Marisol, and Agustín kindly offered to help. So, with the assistance of a generous bequest from a long-time donor's estate, Ecology Action funded an international GROW BIOINTENSIVE outreach and networking event in which ECOPOL/El Mezquite's three Master-Level GB Certified Teachers traveled from Mexico to Kenya to give a week-long basic-level GROW BIOINTENSIVE Teacher Certification Workshop in November 2023, hosted by the co-directors of our partner organization for Africa, Samuel Nderitu and Peris Wanjiru Nderitu of the GROW BIOINTENSIVE Agriculture Centre of Kenya (G-BIACK).

The participants at the workshop were grouped into "Beginners" who understand the 8 Essential Principles of GB and implement them in their gardens; "Intermediates" who have practiced GB with all 8 Principles for at least two years; and "Advanced" who had all participated in some form of internship, either in-person or over ZOOM.

The result of this event is that there are now 50 Basic-Level GB Teacher Candidates in Africa, working their way through the program requirements, 25 of whom Juan estimates will become certified. Certification means a GB teacher has demonstrated that they truly understand how to practice the method sustainably, using all eight elements of GB, including keeping track of their soil and crop data. Agustín has noted that one of the challenges certification candidates face in Africa is a general resistance to recording their data, but it is essential for understanding and achieving truly sustainable (and maintainable) GROW BIOINTENSIVE soil fertility and high yields over time. Certified teachers maintain GB demonstration gardens and hold workshops of their own, training participants to use the method and identifying new candidates for certification. In this

way, GB grows out into communities like healthy mycelia in the soil, making numerous, intricate connections, sharing information and growing fertility into abundance.

In addition to the larger group, five candidates were identified in Kenya for fast-track teacher certification within a year, based on their long-term work with their own well-established GROW BIOINTENSIVE programs and projects: Samuel Nderitu (G-BIACK), Wamalwa Murefu (Biointensive for Africa), Boaz Odour (Good Nutrition for Everyone), Simon Nyaga (Bold Impact Africa), and Mlesh Mlegwah (Garden of Hope). We are confident this core group of individuals will not only help spread GB through their training programs, but represent the future of regenerative farming in Eastern Africa. Samuel and Wamalwa have already obtained their Basic-Level certification, and Boaz, Simon, and Mlesh are on track to Basic-Level Certification by the end of the year. Juan estimates it will take them all five years or less to reach Advanced Certification, at which point there will be five Master-Level teachers in Africa. For the next five years, ECOPOL/El Mezquite has committed to hold *Learning Circle* sessions online with the Kenyan group once or twice per month.

It's so heartening to see this cooperative work among people from such diverse cultures and geographies yielding such good results, and I look forward to the blossoming of the African GB Teacher Certification Program. My thanks and blessings go out to everyone involved, including our generous donors: *Asante* and *Gracias*!

Meanwhile, here at The Jeavons Center, the work is ongoing: now in our 52nd year on our hillside outside Willits, CA, we're continuing to nurture our mini-farm ecosystem with the goal of helping improve GB, so that small-scale farmers and gardeners around the world can do more with less.

This work includes the "Growing Bed 21" experiment: an ongoing study of benefits and challenges of using four different types of compost with different carbon:nitrogen ratios on different parts of the same growing bed. The results of this study may be used to show people how to hold more water and nutrients in the soil—an important piece of information for the five billion people, or around two-thirds of the world's population, who will face severe water shortages by the year 2050. It also includes experimenting with different crops to understand which ones work best under the difficult conditions marginalized farmers face. This August, we planted Early Stone Age Wheat, known as *Einkorn (Triticum monococcum)*. First cultivated in the fertile crescent of the Tigris/Euphrates confluence 10,000 years ago, Einkorn is known as our "first wheat". The name comes from the German word for "single grain" as each spikelet contain a single flower and produces only one seed, unlike the multi-grain spikes of modern wheat. Einkorn is interesting because it is heat tolerant, and has a much shorter growing season, taking only 5 months to mature compared with 8 months for Hard Red Spring (HRS) Wheat. It contains 18.3% more protein than modern wheat, and more antioxidants as well, with a milder flavor (and potentially better digestibility, as it lacks modern wheat's "D" chromosome, which is associated with wheat intolerance in many humans). Depending on the climate, it can grow up to 2.5 feet high with as many as 8 soil-aerating tillers, compared with 5 feet/4-5 tillers for HRS Wheat. Grown on 5-inch centers, we expect an intermediate-level GB yield of 10 lbs/100ft^2. The downside is that Einkorn is harder to thresh than HRS Wheat: we currently thresh it by hand, with gloves on, but are working on a better way. Want to try it out? You can find Einkorn at quailseeds.com, and you can learn the GROW BIOINTENSIVE method at our upcoming 4-Saturdays Online Workshop. ●

Victory Gardens for Peace Mini-Farm Report

By Matt Drewno, VGFP Mini-Farm/Seedbank Manager

Greetings from the Victory Gardens for Peace Mini-Farm on the coastal bluffs of northern California! We have been busy and focused, working with our on-site interns—Philomena Njeri Njoroge and Teresiah Nyambura Njai, both from Kenya—and continuing our programs and efforts in our community and abroad. I am in my 14th year of working with the GROW BIOINTENSIVE (GB) Method here at our site and as with each year, I am excited and steadfast in understanding how this method can improve soils and increase yields.

Last winter's rainy season brought significant rain for the first time in years and with that, we have seen an increase in vitality in the garden that we haven't witnessed in years. The healing rains helped leach excessive salts which have been increasing over time due to the poor quality of our irrigation water. Careful conservation methods and application of GB techniques such as close plant spacing, composting, carbon farming, hand-watering and crop selection have demonstrated that even in situations where the irrigation water raises boron and sodium levels to toxic proportions, we can obtain reliable and decent yields, almost always above US and global averages and contrary to what is believed possible in many circles. In fact, we have seen boron levels exceed 15ppm in some parts of the garden, compounded with high levels of chlorine and a pH of 10 in our irrigation water.

(See the *Soil Science Spotlight* article growbiointensive.org/Enewsletter/Summer2024/soilsciencespotlight.html for a discussion of how mineral salts affect soil health.)

The combination of the water system and what is likely a little saltwater intrusion in our well (a common occurrence in a coastal environment) have made growing challenging, but also highlighted what is possible with this important agricultural technique. What we have learned is that deep soil preparation facilitates leaching in the rainy months, helping balance levels of boron. Careful and timed application of gypsum in combination with deep soil structure helps us leach sodium. The regular application of compost grown on site helps buffer these toxicities and aid in the maintenance of deep soil structure and soil biology, despite the challenges. Close plant spacing creates a living mulch, reducing evaporation and concentration of salts in the soil horizons while also creating an increase in yields of both biomass and roots, which further feed the soil biology and reduce the impact of salts on

image: word of mouth magazine

(Left to right: Philomena, Teresiah, Matthew and Matt celebrating the construction of a compost pile.)

what would otherwise be struggling seedlings. We have also learned when and how to water most efficiently given the challenges on site, helping ensure that salts remain dispersed rather than concentrated, furthering plants' abilities to overcome the challenges and establish themselves.

This garden has taught us many lessons and it is a joy to work with folks old and new to the garden. Matthew Gammett is in his second year as a full-time staff person and consistently surprises me with the depth of understanding and insight he has into the garden we work. Adrian Jung is our most recent staff addition, coming to us with a wide perspective of farming experience, and growing fast in his capacity as a biointensive farmer. Teresiah comes to us from Garden of Hope in Voi, Kenya near Mombasa. We have been working with her family over the years, helping their team grow and expand their capacity. They have helped us grow too: Mlesh, her husband, was with us in 2018, her niece Clarice graduated from Ecology Action last year, and now Teresiah is here. Their family brings such wonderful energy and dedication to the movement of GB efforts in their home country and abroad, and their kind and joyful attitudes have left an imprint on many friends here in the states. Philomena works with our partner G-BIACK in Thika, Kenya and impresses me on a daily basis with her sharp attention to detail and intelligence. She is a dedicated and hard worker and a strong asset to the G-BIACK team. We are grateful for everyone's contributions to another amazing year.

In the garden this year we are seeing greener plants, higher yields and healthier life compared to years prior. I know part of it has to do with the rain helping flush our soils of salts, but also with the warmth and care of our staff and interns. And we wouldn't be here without you: so thank you also. It's the family of people globally that care about the Earth, its inhabitants and life, that keeps the flame alive and the great hope that we are creating a better future. A return to the Earth is necessary. A love for life is necessary. To be present and in the company of good friends is a blessing. Thank you for being a part of Ecology Action, together we are a vehicle for inspiration, demonstrating a new way forward based on timeless traditions of working with each other and nature to bring about paradise on Earth.

Bless you all! •

Greetings from Garden of Hope, Kenya

By Mlesh Mlegwah, Director, Garden of Hope CBO

Jonnes Ellijah Mlegwah (Mlesh), a 2016 EA intern, is Director of the non-profit CBO Garden of Hope (GOH) in Taita-Taveta County, Kenya. Mlesh shared the following at facebook.com/mlesh.ellijah. In a region enduring long-term drought, GOH is an oasis that shows what hard work and GROW BIOINTENSIVE can do. A small donation can have a big impact! Please give at donatenow.networkforgood.org/gardenofhope

Drought-stricken countryside (above) compared with GOH (below)

Hello Ecological farming friends! This September is one of our driest months of the year. I thank the Garden of Hope team for making the place look green despite the drought and rejuvenating hope for many local people. I am also thankful to our partner and friend Michael Graham and the Ohio community for their kind support. They organize a fundraiser for Garden of Hope in August where last year they enabled us to purchase a 10,000 liters water tank and this August 2024 they have enabled us to purchase 3000 pieces of baked bricks. We aspire to build a small house for our team thus we still need more materials like foundation blocks and building cement and we are targeting to roof the house by the end of October before our OND rain season kicks off.

I once more wish to thank all our friends and supporters: you have made this place for sure to be a dry-land farming, training, and research site for both the locals and other farmers and leaders from other countries.

May our Creator bless you!

Mlesh •

Soil Science Spotlight: The Dr. John Doran/ USDA Soil Quality Test Kit Guide, Part 6

By John Beeby (growyoursoil.org)
Ecology Action Soil Fertility Advisor

Soil testing and the correct use of organic amendments are important parts of GB and "Soil Science Spotlight" introduces the topic to the GB community. This is an excerpt from a longer article which you can read at growbiointensive.org/Enewsletter.

In parts 1-5 of this series, I introduced Dr. John Doran's USDA *Soil Quality Test Kit Guide* (bit.ly/DoranSoilTest), and discussed the *Guide's* tests for infiltration, physical observations, aggregate stability, earthworms, soil respiration and pH, and electrical conductivity (growbiointensive.org/SoilScienceSpotlight). In this issue, I want to talk more about one of the *Guide's* tests: **bulk density,** specifically, how to know when adding air to soil (tilling) may be helpful, based on bulk density.

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To dig or not to dig, that is the question...at least once a year for farmers and gardeners around the world. Even the no-till ones wonder about this sometimes, and rightly so. For a soil to be healthy, it must have sufficient air in it, because the soil breathes. It breathes in air from the atmosphere, through the physical forces of mass flow and diffusion. Mass flow drives the transfer and exchange of *atmospheric air* and *soil air* due to differences in air pressure. Diffusion is the process that occurs when gases in higher concentration want to move to areas where they are lower in concentration: oxygen in atmospheric air diffuses into soils because there is typically a higher concentration of oxygen in atmospheric air compared to soil air. Similarly, carbon dioxide moves from the soil air to atmospheric air because there is typically a higher concentration of carbon dioxide in the soil than there is in atmospheric air. So, with this air movement, it can be thought that the soil is breathing. In fact, the life in the soil is respiring, taking in oxygen and converting energy-containing carbon molecules (soil organic matter) to carbon dioxide (and other substances), which is the source of the lower concentration of oxygen and greater concentration of carbon dioxide in the soil air compared to atmospheric air.

All this air movement, breathing and respiring, does not occur if the soil is so compacted that little air can enter or exit it. And a soil that is not breathing is a soil that is dead, infertile, and prone to rapid degradation. So how much air does a soil need and how do we know if it has enough or if adding air to the soil would be helpful?

One way to answer this question is to measure the soil's bulk density. In general, if a soil's bulk density is greater than 1.6 g/cm^3, there is not enough air in the soil and roots will not be able to grow uninterruptedly into the soil.

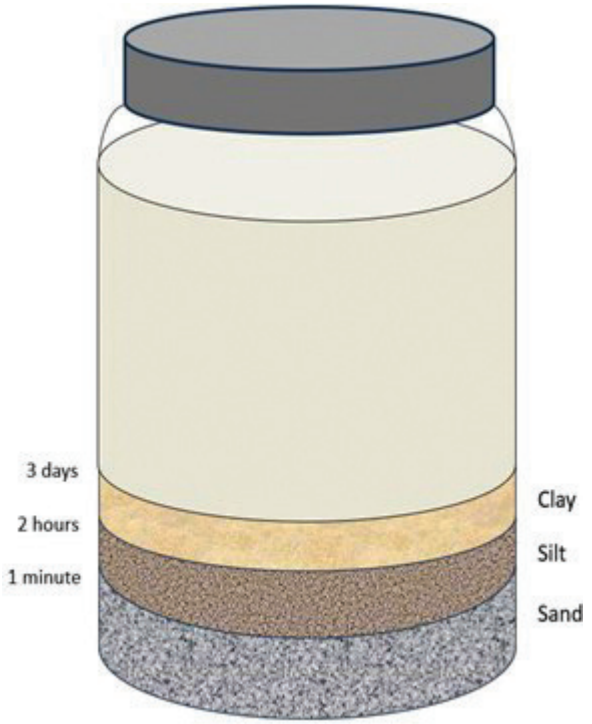
Measuring a soil's bulk density

Rather than using 1.6 g/cm^3 as the limit for all soil types, a better way to gauge whether a soil needs more air is to know the soil's texture, which has a large effect on how much air can enter and exit a soil. Once you know the soil's texture, you can use the table below to determine if more air is needed.

Soil Texture	Ideal bulk densities (g/cm^3)	Bulk bulk densities that may affect root growth (g/cm^3)	Bulk bulk densities that restrict root growth (g/cm^3)
sands, loamy sands	<1.60	1.69	>1.80
sandy loams, loams	<1.40	1.63	>1.80
sandy clay loams, loams, clay loams	<1.40	1.60	>1.75
silts, silt loams	<1.30	1.60	>1.75
silt loams, silty clay loams	<1.40	1.55	>1.65
sandy clays, silty clays, some clay loams (35-45% clay)	<1.10	1.49	> 1.58
clays (>45% clay)	<1.10	1.39	>1.47

Soil texture is based on the amount of sand, silt and clay there is in the soil. Sand particles are quite large and visible to the eye. Silt particles are much smaller and are not visible to the naked air. And clay particles are much, much smaller than silt particles! While all of these particles can exist in a compacted state, when sand is compacted, there is still quite a lot of space between the compacted sand particles through which air and water can travel. When silt particles are compacted, and especially when clay particles are compacted, there can be very little space between the particles, making passage of air and water very slow and difficult.

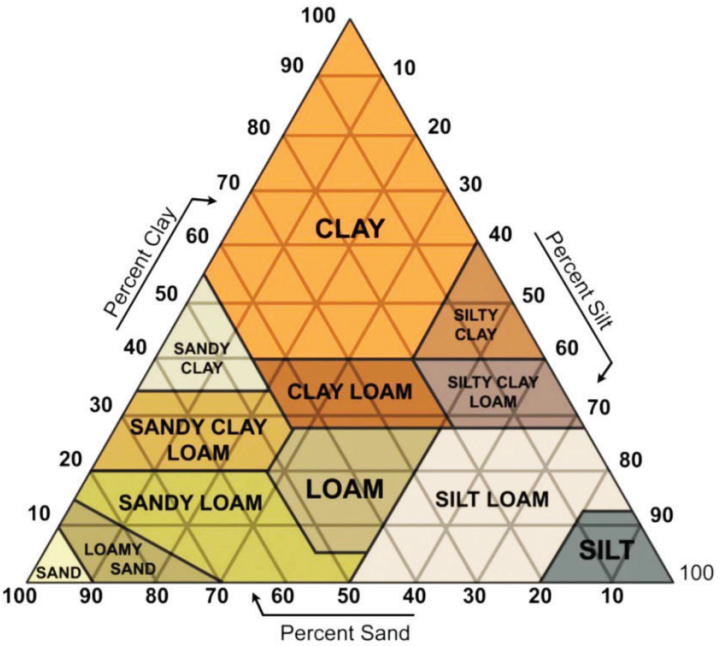
Soil texture is classified by the percentage (by weight) of sand, silt, and clay particles in the soil. There are 12 different texture types (sandy, sandy loam, silty clay loam, clay, etc.). Determining a soil's texture can be done in one of two ways. The first method is known as the *Jar Method* and while there are different procedures published to perform it, I've found this one works well.



How to determine soil texture with the Jar Method

Items needed:
Jar (1 quart or 1 liter) with a tight lid

Procedure
1. Add sifted soil to 1/3 of a jar.
2. Fill the jar with water, leaving some space.
3. Add one tablespoon of powdered dishwashing detergent.
4. Shake or stir/agitate vigorously for 20 minutes, then leave undisturbed on a level surface.
5. After one minute, mark the level of the settled soil. This is the sand.
6. After 2 hours, mark the level of settled soil. This is silt.
7. After 3 days, mark the level of settled soil. This is clay.
8. Measure the height of each layer (not including the top layer of water).
9. Divide each height by the total to get the percentage of sand, silt, and clay. Example: Sand is 2 cm, silt is 1.7 cm and clay is 1.3 cm. Therefore, the % sand is sand height/total height = 2/5 = 40%
10. Use a soil texture triangle (below) in your language to determine the soil texture.



How to determine soil texture with the Ribbon Method

The second method to determine soil texture is faster, requires no equipment, and can be done in the field, but does take a little more experience to do accurately, and it is called the *Ribbon Method*...

... {Method and discussion continued online at growbiointensive.org/Enewsletter}

Grow YOUR SOIL

Soil Science Spotlight

If we understand a soil, we can improve it

The Dance of the Elements: Matt Drewno on How to Compost with the Carbon Cycle

From *Word of Mouth* Magazine, by Torrey Douglass

Full article at: wordofmouthmendo.com/word-of-mouth-stories/2024-fall/the-dance-of-the-elements

image: word of mouth magazine

If Matt Drewno could ask of you one thing, it would be to "Challenge yourself to grow your own soil as best as you can." It's easy to walk into a nursery, feed supply, or big box store's garden center and walk out with a bag of high quality dirt, but Matt recommends against it. "People feel like they have to buy things to make it work, but that's not necessary. You don't need to spend $1,000 to grow a head of lettuce."

Matt is the Vice President of Ecology Action, founder of Victory Gardens for Peace, and Director of Biointensive Community Garden Initiatives in Fort Bragg and The Stanford Inn Biointensive Research Garden in Mendocino—so he knows a thing or two about how to care for plants. Rather than buying soil, Matt encourages people to simply mimic how nature makes it. It's arguably the best thing we can do for our food supply. As Matt puts it, we should "feed the soil, not the plant—a healthy soil will grow healthy plants." To do so will deepen your relationship with nature as you connect with its cycles, harnessing the perpetual dance of our planet's elements, a process both primordial and poetic.

The basis of all life on earth stems from the photosynthesis and respiration of plants—an ongoing reciprocation between a plant and the four elements. The sun (fire) provides warmth, air supplies CO_2 and oxygen, earth offers its minerals, and water carries nourishment throughout the plant's body, much like blood does within ours. The plant turns sunlight into sugar, and sugar into energy, then uses that energy to pull carbon (CO_2) from the air and minerals from the soil to grow more of its plant body, while simultaneously breathing out the oxygen we humans are so fond of.

Matt describes topsoil as "where atmosphere meets earth," continuing, "at that interface there's a lot of transformation and dynamic processes that generate abundant, healthy soil that feeds the plants. [There are also] microbes and other organisms living in the soil, making paths and tunnels, and leaving their waste." That waste adds nourishment while the tunnels allow air flow, an important benefit since the biological material can't break down without it.

It takes 500-2,000 years to build an inch of topsoil naturally, and agriculture requires increased nutrient cycling, so it makes sense for humans to step in and help things along. Feeding the soil keeps land from becoming depleted, and when done correctly, that land can remain productive indefinitely. Matt points out that there are farms in Asia that have been producing food for over 4,000 years, yet in the United States, farmers often have to rely on inputs like chemical fertilizers to maintain productivity after just 40 years. And considering that we are headed toward a post-fossil fuel future where those toxic inputs may be less affordable and local food will be the default, maintaining rich, healthy soil to grow that food will be essential. Matt encourages, "You can grow your own soil—it's cheap and easy and it's one of the best things you can do now, and for the future."

At the heart of growing soil is harnessing the carbon cycle—that dance between plants and the elements. Once moisture is removed, plants are roughly 50% carbon by dry weight, so the goal of composting is to create carbon-rich soil that can become future plant life. Carbon farming involves growing plants not just for the food they produce, but also for their biomass—the unused parts of

the plants left over after harvest. Selecting crops that generate high volumes of biomass in addition to their edible output will increase the carbon removed from the atmosphere during their lifespan and give a gardener lots of raw material for soil building after it. Organic gardening pioneer Alan Chadwick was fond of saying "Life into death into life," describing how plants grow, then die, then feed new life. This is the dance soil-building gardeners step into, learning the steps and feeling out the rhythms. And with an expert like Matt at the lead, you will be finding your groove in no time.

The key, according to Matt, is the balance between mature and immature plant material. In the past, composting advice has categorized the types of materials to add to your compost as brown/green, wet/dry, or carbon/nitrogen. A better approach is the mature/immature description. Immature materials come from plants before they've flowered, transitioning into mature materials once that process begins. Explains Matt, "once they begin flowering, their carbon structures transform, becoming more rigid to support the plant getting off the ground and into the air, resisting the wind and ultimately flowering and bearing the weight of seeds." To find out if a part of a plant is mature or immature, test its rigidity—if it snaps when you break it, it is mature.

Matt continues, "Immature materials are soft and flimsy, and have simpler carbon structures which break down quickly. They help drive a more intense decomposition process with a greater degree of sugars and starches." Examples can include garden cuttings, fresh cut grass, cut fresh flowers (provided they are organic and not treated with preservatives), cooked food waste, livestock manure, and pruned plants provided the stems and leaves are fresh green and pliable.

In contrast, "Mature materials break down slower, often require a diversity of microbes and host a small ecosystem to break down completely. This slows down the carbon cycle." These materials can include dried leaves, sticks, and branches from cleared land, corn cobs, rigid vegetable cuttings like a broccoli stalk, and raw potatoes, celery, or carrots. If it takes some effort to chew, you can consider it a mature material.

... {continued online at wordofmouthmendo.com/word-of-mouth-stories/2024-fall/the-dance-of-the-elements}

Food and Wine: Ultra-Processed Plant-Based Foods Can Increase Your Risk of Serious Health Issues, New Study Finds

The following is an excerpt of an article published in Food and Wine in August 2024, which you can read at foodandwine.com/processed-plant-based-foods-unhealthy-study-8690005. We all know eating more plants helps build good health. However, many people lack access to fresh food (or don't/can't cook fresh), and turn to ultra processed plant-based convenience foods hoping they will provide the same health benefits as fresh fruits and vegetables. Unfortunately, the opposite is actually true: ultra-processed foods are unhealthy even when made from plants. The GROW BIOINTENSIVE method provides a low-cost method for almost everyone to grow a balanced, nutritious, plant-based diet that avoids the hazards of ultra-processed foods. Download our free GB Farmer's Handbook from growbiointensive.org/ePubs to start growing!

For years, public health officials have stressed the importance of following a largely plant-forward diet to lower one's risk of developing a range of serious diseases. But not all plant-based foods are created equal, leading to plenty of confusion about what you should — and shouldn't — reach for at the grocery store.

Now, new research suggests that opting for ultra-processed plant-based foods can raise your risk of experiencing serious health events like heart attacks and strokes. The study, published in *The Lancet Regional Health - Europe*, analyzed nearly a decade's worth of data from about 118,000 adults who participated in the UK Biobank, a long-term study of health and lifestyle in the UK. Overall, the researchers discovered that the more ultra-processed foods people ate, the higher the odds they would die from heart disease.

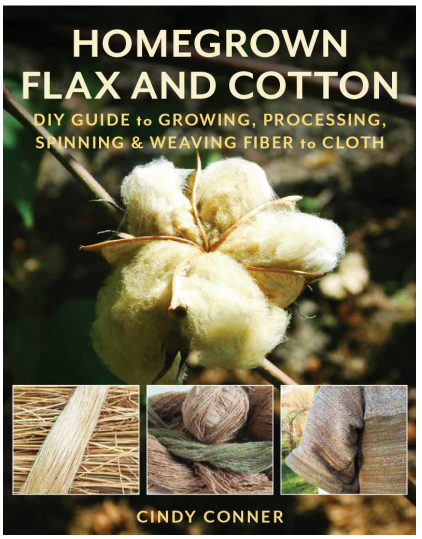
Specifically, for every 10% increase in calories from plant-based ultra-processed foods, people had a 5% higher risk of developing heart disease and a 6% higher risk of coronary heart disease.

But it wasn't all bad news for plant-based products. For every 10% increase in whole plant-based foods, people had an 8% lower risk of developing coronary heart disease and a 20% lower risk of dying from the condition. These people also had a 13% lower risk of dying from any cardiovascular disease. *...{full article online}*

Book Review: Homegrown Flax and Cotton

By Cindy Conner , Review by Shannon Joyner

Cindy Conner is a Virginia-based Certified Intermediate-Level GROW BIOINTENSIVE Teacher and a prolific author. She has written several books, including *Grow a Sustainable Diet* and *Seed Libraries*, and created the video-courses *Develop a Sustainable Vegetable Garden Plan* and *Cover Crops and Compost Crops IN Your Garden* based on GB techniques. Her new book *Homegrown Flax and Cotton: DIY Guide to Growing, Processing, Spinning & Weaving Fiber to Cloth* is based on her experience successfully growing cotton and linen and taking them all the way from seed to fiber – in the form of clothing!



From the back of the book: *"Grow your own sustainable clothes! From seed to shirt, Cindy Conner shows you how to plant, grow, harvest, process, spin, and weave cotton and flax into cloth from which you can sew your own clothes. And since cotton and flax are made from plants, when your clothes' usefulness has passed they can also return to the environment without causing harm--a truly renewable and sustainable option for clothing. Whether you live in colder climates where flax can thrive, or warmer climates where cotton does best, there is a sustainable option (or two, if you live in the temperate zone) for you. And it takes much less space than you would think; a backyard garden will do! This complete guide includes in-depth instructions on growing and harvesting, preparing the fiber for spinning, the spinning process for each fiber; the basics of weaving cloth; and suggestions on patterns and how to weave the pieces you need for clothing, and how to sew your woven pieces together. Cindy has been growing her own clothes for years and teaches the process in classes, so she includes all of her knowledge on potential pitfalls and how to avoid them in her thorough instructions on each phase. You can grow your own flax and cotton and make clothes to your own style preferences. It's time to take the next step in sustainable living and make your own clothes in breathable and comfortable natural cotton and flax grown in your own backyard!"*

The book tells you how to plant, grow, harvest, process, spin, and weave flax and cotton into cloth that you can sew into clothes, and includes directions for making flax hackles and detailed plans for a tabletop flax brake and a one-yard swift. Chapters include: Why Wear Homegrown, Homespun Clothes; Growing Flax for Linen; Retting; Breaking and Scutching; Hackling; Spinning Flax into Linen; Growing and Harvesting Cotton; The Cotton Project; How to Manage Spun Fiber; Turning Yarn Into Fabric; Clothes to Make; Guilds, Fiber Festivals and the Fibershed Movement; Spirituality of Handspun Cloth—plus a glossary, a resources section and a full index.

Homegrown Flax and Cotton: DIY Guide to Growing, Processing, Spinning & Weaving Fiber to Cloth is 152 pages, with many full-color photos. Created with love and caring over many years, it's a bargain at $29.95 for a signed copy, available from Cindy's website, homeplaceearth.com/book-and-dvds. You can find out more about Cindy's work on her blog *Homeplace Earth* (homeplaceearth.wordpress.com), and read our 2018 article about her at growbiointensive.org/Enewsletter/Fall2018/CindyConner.html.

We're proud of you, Cindy! •

GROW BIOINTENSIVE Garden Tours at TJC and VGFP this October

Dear friends, We've all noticed rising food prices over the past few years, and many are experiencing economic challenges as a result. In response, many people are interested in making changes and acquiring new skills to build food security. One of the most impactful ways someone with even a small garden can save money and grow more (and more nutrient-dense) food is by increasing the fertility of their soil and becoming more efficient in the way they garden.

GROW BIOINTENSIVE® Sustainable Mini-Farming (GB) is a reliable "smallest-scale" method perfect for backyard farmers and gardeners. It builds soil fertility and produces higher yields using much less garden space, and as little as 1/3 the water compared with conventional agriculture. It can be practiced by almost anyone, anywhere with access to a patch of land and some water, with very few purchased inputs and no heavy machinery. We teach GB to farmers all over the world, and because of our activities, millions of people are growing abundant, nutritious food, and are now part of our "ecosystem of hope" based on real results. We're hoping you want to join in the fun!

Do you want to see how the method works before you try it out? Come look at our gardens! Both sites started out with poor soil barely able to grow grass, and both now consistently yield higher-than-conventional harvests of delicious, nutritious food every year—and each year we cultivate, we improve soil fertility too. We're holding two more garden tours this year: **October 12 at Victory Gardens for Peace** on the Mendocino Coast, and **October 13 at The Jeavons Center** in the mountains above Willits, CA. We would love to have our gardening (and garden-curious) community come join us for an afternoon of discussion, demonstration, and exploration.

Our gardens are visually stunning and spiritually refreshing, and the tours have a strong group element: enthusiastic participation is encouraged! Our time together includes discussion of world challenges in the areas of soil, food, and nutrition; the connection between thinking globally and acting locally; discussion of several crops that every small-scale farmer and gardener should know; and practical things we can all do to make a difference. It also includes mini-classes on double-digging, composting, seed propagation, and sustainable home garden crops to get you started.

Tours begin at 9 AM and end around 4 PM. Please bring your own lunch to enjoy in the garden, along with a hat, a jacket or sweater, and a water bottle. Wear hiking boots or shoes with good tread, as both garden sites have uneven ground. The Jeavons Center is located on a steep hill where visitors will walk the equivalent of 25 flights of stairs to reach all parts of the garden. The Victory Gardens for Peace site is much more accessible. Please leave pets at home.

Registration is $25 per person ($15 for Ecology Action members or those who join at registration). Register at growbiointensive.org/tour. Space is limited, we hope to see you in October! •

Harvest time at The Jeavons Center

Double-digging demonstration at Victory Gardens for Peace

Lebanese Garlic Sauce (Toum)

By Shannon Joyner, Garden Companion Editor

image: shannon joyner

Native to Central Asia, garlic (*Allium sativum L.*) is now grown across the globe. It has long been a staple flavoring in diets across Asia, India, the Middle East and the Mediterranean, and valued as both food and a medicine for thousands of years. With a new garlic harvest coming soon, a delicious way to use fresh garlic is to make the tangy-spicy Lebanese garlic sauce called *toum*. Similar to the Provençal *aioli* (which uses garlic and egg yolks), *toum* is an ultra-simple vegan version that emulsifies garlic, lemon juice, salt, and oil into a stable, creamy, spreadable condiment that can be used as a spread, dip, dressing, soup-base, marinade, or sauce. Most recipes recommend making *toum* with a neutral vegetable oil, which results in a bright white sauce and a clear garlic flavor, but I prefer to make it with a mild olive oil, which results in a greenish sauce that has a slightly bitter olive flavor—and all the health benefits of olive oil. Try a batch of each and see which you prefer!

Lebanese Garlic Sauce (Toum) Makes ~1 cup

1/2 cup peeled garlic cloves
1/4 cup freshly squeezed lemon juice
~½ teaspoon salt (to taste)
1 cup neutral vegetable oil, or mild olive oil

If your garlic has green centers, split the cloves and remove the green sprouts (they'll make the sauce bitter). Place garlic cloves, lemon juice, and salt in a tall, narrow glass container like a mason jar, and use an immersion blender to blend to a paste. With the blender head (off) still in the jar, pour all of the oil in, covering the garlic and blender head completely. *Without lifting the blender head out of the oil*, begin blending with a gentle up-and-down motion to gradually emulsify the garlic and the oil into a thick, mayonnaise-like sauce. When all the oil has been mixed in, taste your sauce and adjust the seasoning. Store, tightly covered, in the refrigerator for up to a month. Use it on *everything*. Yum. ●

What We're Doing Now: Garlic at The Jeavons Center

By Shannon Joyner, Garden Companion Editor

Many years ago, at The Jeavons Center mini-farm, we tested three methods of growing garlic:

1. Sprouted in flats, and then transplanted (the standard GB procedure for most plants)
2. Planted unsprouted, directly in a growing bed, protected under a miniature greenhouse
3. Planted unsprouted, directly in growing beds, and not under a miniature greenhouse.

Method 3 gave the best results, so it's how we've done it since: planted on 4" centers (1,343 cloves per 100-sq-ft bed) almost at surface-level, with the pointy growing tip of a clove left about 1/4" above the soil and the root end about ¾" below the soil. At intermediate-level GB yields, we expect to harvest approximately 120 lbs/100 square feet, plus 15 pounds of air-dry biomass for compost.

...but we never stop learning! Recently, John came across a video (youtube.com/watch?v=nB8uclGf4ac) showing a test of different garlic planting depths, which appears to show that planting at 4" and 7" deep can increase productivity compared with surface planting as we do it. So this fall, we're going to try the experiment ourselves: planting our garlic at different depths to see if we can increase yields even more. With luck, we'll have some interesting results to share with you next fall!

When planning your garden, don't forget that garlic requires a period of "vernalization" – 4-8 weeks below 40°F to produce bulbs—so you need to time your planting to go with your climate (or in warm climates, to trick your bulbs into thinking they've gone through the winter by vernalizing them in the refrigerator).

According to epicgardening.com/plant-fall-garlic: "*Hardneck garlic is more cold-hardy and best for northern climates. It requires the chilly winter (vernalization period) to create full bulbs. As the name implies, hardneck garlic has a stiff central stalk. They are the only kind of garlic that sends up buttery-delicious scapes (flower stalks) during the spring or summer. The cloves tend to be larger, easier to peel, and more complex in flavor. Plant hardneck garlic right around the first fall frost to ensure that it gets a full 4-8 weeks of cold exposure below 40°F.*

Softneck garlic is best for mild or warm climates. It only needs mild cold exposure (vernalization) to grow a bulb. This can be easily hacked with 5-10 weeks in a refrigerator before planting. Softneck varieties have a soft stalk for garlic braids. They have a longer storage life, smaller cloves, more wrappers, and mild to hot flavors.

image: cynthia raiser jeavons

In tropical climates, plant softneck garlic during the early winter after 5-10 weeks of refrigeration (not freezing).

For the most part, you should be planting garlic between September and November. In frigid northern zones 0 through 4, it can be planted throughout September. In zones 5 through 7, hardneck garlic is traditionally planted in October. Growers in zones 8 and 9 typically wait until October or November. Frost-free tropical growers in zones 10 through 11 often grow softneck garlic in only the coolest months of December through January, but can also plant hardneck garlic in October to November, particularly if they vernalize in advance. ... Use the USDA Plant Hardiness Zone Map to determine your growing zone, and then head to Farmer's Almanac to calculate the estimated first frost date of the autumn. This will give you a good idea of the best window of opportunity for getting your garlic in the ground."

At The Jeavons Center, depending on the weather, we plant garlic around October 1 and plan to harvest them around August 1 the next year. We like both soft- and hard-necked varieties, interplanted with drying flowers which can then be used to enhance the beauty of garlic braids (soft-neck are easiest to braid, but hard-necks can also be braided with colored silk ribbons). We've tested over 40 varieties over the years and are partial to *Asian Tempest* for its delicious flavor and short growing season (it typically ripens several weeks sooner than most hardneck varieties). But so many varieties taste good, you should try several and find out what you (and your garden) like best!

When selecting which cloves to plant, remember that the largest bulbs produce the largest plants (ncbi.nlm.nih.gov/pmc/articles/PMC8589488/). This is because the larger cloves contain more nutrition to feed the growing plant and to build another crop of big bulbs. Each bulb is made up of 12 cloves: six small cloves in the center (which we use for cooking) and six large cloves on the outside, which we save for planting. We store them for two months in a cool dry area, and then plant them as noted above. How do we know when to harvest without digging up bulbs to check them for size? Initially, 12 green sprouts emerge from each clove and grow as green leaves though the season. When 6 of these leaves have started to wither and die off, the bulb is mature, and it is time to harvest those plants.

While we usually plant garlic in the fall, if you miss your window, don't despair! In the June 2004 issue of *HortScience*, the article "*Low-temperature Storage of Garlic for Spring Planting*" shows that when stored at –3°C (27°F), cured garlic bulbs harvested in the summer can successfully be planted in the spring! "*Garlic bulbs (*Allium sativum L.*) harvested in the summer are often stored at room temperature between the time of harvest and curing and either consumption or planting in the fall. The quality of these bulbs usually deteriorates dramatically by 6 months after harvest. Garlic bulbs were placed at –3, 0, or 5°C for ≈6 months to determine if bulbs could be maintained for spring planting. Response to cold-storage conditions was cultivar dependent. We found that most cured garlic bulbs stored at –3°C for 6 months successfully formed cloves within bulbs when planted in the following spring. Unlike the high-quality bulbs formed after –3°C storage, bulbs stored at 0°C for 6 months often formed side cloves and had loose wrappers. In another study, garlic bulbs stored at 0, 5, 15, or 23°C exhibited a higher rate of shoot elongation within the cloves during storage than bulbs stored at –3°C. After 9 months of –3°C storage, bulbs then held at room temperature retained the quality characteristics of freshly harvested garlic (firmness, taste) for at least 2 months. These studies suggest that cured garlic can be spring planted and consumed year-round when bulbs are stored at –3°C*" (journals.ashs.org/hortsci/view/journals/hortsci/39/3/article-p571.xml?tab_body=pdf)

Pumpkin spice may be on everyone's mind as summer transitions into fall, but here at TJC autumn means garlic spice, all the way. •

Cover Crops: Choosing and Timing

Adapted from the Bountiful Gardens Archive

image: ecology action

It's all about the roots.

Did you know that when you plant cover crops, the roots make more compost than the tops? Winter rye makes 380 miles of roots per plant! When the tops are cut, those roots make compost right in the soil, so none of their nitrogen or carbon is lost to the air—and you don't have to haul, turn, or shovel it. Grasses like rye are among the most effective means of sequestering carbon in the soil, and putting it to work building fertile soil organic matter. Legumes like clover pull nitrogen out of the air into nodules on their roots, feeding the plants around and after them.

When you plant makes all the difference.

With winter cover crops, the size of the root system that develops is largely determined by when you plant. After the soil gets cold, growth slows or stops. To get the best growth, we recommend sowing cover crops 2-4 weeks before your first fall frost.[1] Don't be surprised if the plants don't get tall—they will be busy underground. In actual tests, crimson clover that was only 2 inches tall by November nevertheless had roots 12 inches deep, with many nitrogen nodules already fertilizing the soil; rye only 6 inches tall had roots 20 inches deep. With a good head start below ground, those plants will size-up fast in the spring, making lots of biomass for compost material. And most importantly, the roots will be holding your soil, providing channels for water absorption, and adding miles of organic matter to your garden.

But how can you plant cover crops in September when so many of your garden beds are still producing vegetables? Here are some options:

- You can broadcast the seed of your cover crop into the bed while the existing crops are still in place. This is easiest if the crop is fairly upright, but is still possible for many crops with a more sprawling habit. The technique is called undersowing. You could undersow vetch into a tomato bed, for example. (We have had some luck deterring squash bugs by undersowing fall radish into a squash bed in August, then cutting the squash plants and getting a crop of daikon in late winter.) Clover is a great crop for undersowing, as it doesn't need as much sun as cover-crop grains do.
- Consider carefully whether a bed is still actually producing. It is a reflex for most of us to leave summer crops until frost, but beans, squash, corn, etc., are often done by mid-September. If they are no longer producing good harvests, move on. You will gain a lot by building fertility for next year.
- You can sow winter wheat or rye, or white clover, into unused corners of the bed, paths, and any empty space, even if it is not directly in the bed. They will make turf you can walk on and even mow if desired. It will still benefit the garden and hold the soil during the mud season, and you will have more compost material in spring.
- If you have undersown every bed that you can, and set out your fall/winter crops, consider a second sowing later for beds that cannot be sown in September. Rye is the most cold-hardy and will still sprout late, even after the first frost. In fact, if sown on frozen ground, and covered with straw or other light mulch to keep birds form eating it, rye will sprout during thaws and prevent soil loss while keeping weeds from taking over.

What to Plant? Let Nature be your guide.

Most meadows and prairies have a biodiverse mixture of grasses, legumes, and tap-rooted plants that can grow thickly by filling different niches in their over- and under-stories, hold the soil from erosion, prevent compaction, absorb water, and build the soil. The famously fertile topsoil of the midwestern United States were built by just such assemblages of plants. You can mimic that soil-building synergy in your garden by making a mix that includes each of the types below:

- A grass (grains are grasses) like wheat, rye, or barley.
- A legume, like winter peas, bell beans, vetch, or clover. In our standard winter mix we use one upright legume (bell bean) as well as one vining legume (vetch).
- A tap-rooted plant, like fodder radish, California Poppy, or an agricultural mustard, to improve water absorption, bring deep-buried minerals to the surface, and open the way for crop roots to follow.
- If root-knot nematodes or fungus diseases are a problem for you, include ag mustard in the mix.
- Many people also like to include at least one plant to draw beneficial insects: Calendula, *Phacelia* (Bee's Friend), or Chervil would be good options for fall. Yarrow, Cilantro, or *Alyssum* would be great for summer.

In a smaller bed, or a front yard, where you don't want tall grasses, choose lower-growing options:

- Thick-growing, ferny-leaved, ground-cover will let water through to the soil, but hold it securely from erosion. We recommend Bee's Friend for this. It will make a low carpet of leaves all winter and bloom in April.
- A decorative cover crop mix of *Phacelia*, Lupine, Crimson Clover, Woolly Pod Vetch, and California Poppy, mixed with fine dirt, sand, or compost, broadcast and covered with a ¼ inch of soil and then watered well (some of these seeds have natural safeguards against sprouting in the absence of water) will stay at about a foot tall all winter and then grow to 2 feet in spring, while fixing nitrogen and producing several kinds of flowers to delight both you and the beneficial insects that help your garden.
- If you want to replace lawn or create a permanent cover crop—in an orchard, for example—use clover. White Dutch is the lowest and most lawn-like. Red Clover is taller, and fixes a lot of nitrogen, as well as making excellent compost, animal fodder, or mulch when cut. In summer-dry climates, the best choice for areas that will not be irrigated is Birdsfoot Trefoil.

A great new idea—the nutrient-trap buffer strip

If your garden has any slope to it—even a gentle slope—it is almost impossible to avoid losing soil and dissolved nutrients downhill over the course of the winter and early spring. Organic matter is lighter than the sand or clay fractions of soil, and floats away easily. We have seen large amounts of humus recovered from swales at the lowest point of the garden. A great way to keep fertility from leaving your garden it is to plant fast-growing and nutrient-trapping cover crops in a strip at the bottom end of your garden. Rye in winter and alfalfa in summer, or bee's friend in winter and buckwheat in summer—there are many possibilities. The key is to absorb all runoff and turn it into plant matter for composting. We know market gardeners who have made this a major source of fertility for their spring startup.

Don't forget pots and containers.

A low-growing, blooming cover crop prevents your pots, (with their expensive soil mix), from being taken over by weeds. Calendula, poppies, Bee's Friend, salad greens, and peas are great for this. Or consider a “second harvest” mix of Calendula, Bronze Arrow lettuce, Giant Winter Spinach, mizuna, daikon radish, and Austrian Winter Field Pea for a winter pot garden.

For more on individual crops and situations, see our Cover Crop Chart at growbiointensive.org/FAQ/FAQ_CompostCrops.html

[1] For practical purposes, your frost date is when you can expect a forecast of 36 degrees or lower. Why? Weather station equipment is installed at standing height or even at roof level. The temperature below, on the ground, can be colder than the instruments show. So when the forecast expects 36 degrees at the weather station, you can expect 32 degrees at the soil surface. In low spots and areas where air drainage is blocked, it can be even colder. You can find first and last frost dates online by searching for "first and last frost date" and your zip code. •

Ecology Action's Garden Companion

Writer/Editor and Art Director: Shannon Joyner

Contributors: John Jeavons, Matt Drewno, Mlesh Mlegwah, John Beeby, *Word of Mouth Magazine*/Torrey Douglass, *Food and Wine Magazine*, Bountiful Gardens Archive, EA Staff, and GROW BIOINTENSIVE® friends from around the world.

Ecology Action
5798 Ridgewood Road Willits, CA 95490-9730
Phone: (707) 459-0150

Ecology Action newsletters and full-length articles are available online at
growbiointensive.org/Enewsletter/Archive.html

Printed with soy ink on 40% post-consumer paper

Ecology Action Events: 2024

Dear GROW BIOINTENSIVE Family,

Our schedule (subject to change) of public events is as follows.

***Onsite* Garden Tours:**
TJC on Oct 12, 2024 ● VGFP on Oct 12, 2024
http://growbiointensive.org/tour

***Online* Fall 4-Saturdays Introductory Workshop:**
Nov. 16, 30, Dec. 7, 14, 2024
growbiointensive.org/workshop.html

Our full 2024 schedule of events:
growbiointensive.org/events_main.html
or call 707-459-0150

Watch our 2-Week Farmer Training Course:
vimeo.com/ondemand/ecologyaction

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