Building Healthy Soil

Cris Force 1

Web Sites:

https://www.youtube.com/watch?v=QfTZ0rnowcc *17 min.& worth every second!* (Gabe Brown, Regeneration of our Lands)

https://www.youtube.comwatch?v=TucmtBLmeyU (Hope video) *excellent*

http://permaculturenews.org/2014/08/04/soil-science-basics-beginners/
short article, good info; soil food web

https://www.soils.org/discover-soils/soil-basics *update: good news is—we are finding it takes less time that originally thought to regenerate our soil (short article)*

https://www.youtube.com/watch?v=BxiXJnZraxk (climate change & soil connection) "Civilizations rise and fall due to their management of the soil." excellent - 29 mim.

nrcs.usda.gov (Natural Resources Conservation Services) Super good info and lots of it

https://www.youtube.com/watch?v=fjdVQPBBqXQ (Jonathan's story, part 1)
changing the mind from "the way everybody has done it in my lifetime"

http://aggie-horticulture.tamu.edu/faculty/davies/research/mycorrhizae.html *(1 page)*

https://www.smilinggardener.com/sale/mycorrhizae-for-sale?gclid=CJjDpY2nodICFdW1wAodIloDWg
excellent short video about mycorrhizal fungi (2 min.); written info good; NOT promoting the sales at site, though it might be fine; **chart of endo and ecto plants**)

http://www.bigblogofgardening.com/mycorrhizal-fungi-what-it-is-and-why-your-plants-need-it/ *short article but good info*

http://www.bigblogofgardening.com/garden-book-review-teaming-with-microbes/
very short review of Teeming with Microbes by Jeff Lowenfels

http://www.bigblogofgardening.com/magic-weed-killer-no-such-luck/ *tiny article*

http://www.bigblogofgardening.com/the-thriving-ecosystem-in-your-lawns-soil-and-why-it-matters/ *lawn soil*

sciweb.nybg.org/science2/hcol/mycorrhizae.asp.html *three super tiny articles, endo & ecto*

https://microbewiki.kenyon.edu/index.php/Mycorrhizae *wiki version*

https://en.wikipedia.org/wiki/Mycorrhiza *another wiki link* 😃

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Cris Force 2

http://mycorrhizaworld.de/hp563/The-difference-between-ENDO-and-ECTO-Mycorrhiza.htm *two short paragraphs to explain difference in endo and ecto*

http://www.gazettextra.com/news/2011/apr/18/over-tilling-can-cause-more-harm-good/ *over-tilling problems*

http://www.suburbanstoneage.com/2013/10/cover-crops-home-garden/ *cover crops for the home garden*

https://catalog.extension.oregonstate.edu/topic/agriculture/cover-crops *article & chart cover crops for home gardens*

http://ento.psu.edu/extension/factsheets/bees-and-cover-crops *cover crops/pollinators*

https://www.newgarden.com/september-2015/cover-crops *making covers attractive*

http://www.hobbyfarms.com/5-cover-crops-for-your-small-scale-garden-3/ *5 cover crops for your small scale garden.*

http://extension.uga.edu/publications/detail.cfm?number=C1057 *cover crops*

https://agresearchmag.ars.usda.gov/2002/sep/soil *Glomalin/third of world's stored carbon*

http://www.portlandediblegardens.com/blog/2014/10/14/growing-cover-crops-in- your-home-garden *covers in home garden*

http://www.lebanonturf.com/education/mycorrhizal-fungi-and-pH-of-soil-or-water *Mycorrhiza and pH*

https://www.youtube.com/watch?v=Zb7JNP0JPuo *Methods of Applying Mycorrhizal Fungi Inoculants (this is not the best quality video, but info is good, 7 min.)*

https://www.youtube.com/watch?v=QYmrOrTM-FA *Mycorrhiza, explained*

https://www.youtube.com/watch?v=q4lLGMKi0aA *Mycorrhiza, how to use it (5 min.)*

https://www.youtube.com/watch?v=R73_zGa1z6g *drop in food nutrient values in last 50 yr.*

https://www.youtube.com/watch?v=0J34onVfjyk (2 min.) *Gabe Brown, why don't more producers adopt regenerative soil methods?*

https://www.youtube.com/watch?v=9_ItEhCrLoQ *(1 min.). soil stability test*

https://www.youtube.com/watch?v=ggDY35gGBkA. *(1 min.) rainfall infiltration test*

Building Healthy Soil Cris Force 3

Sources for Mycorrhizal Fungi:

mushroommountain.com (I have purchased from this site so I can vouch for their product. Lots of good info at their site.

http://mycorrhizae.com/where-to-buy/retail/

https://www.smilinggardener.com/sale/mycorrhizae-for-sale?gclid=CIDJ7tnPpdICFQEtaQodrE0MEQ (repeat from p.1)

http://mycorrhizae.com/wp-content/uploads/Types-of-Mycorrhizal-Plants.pdf (Table showing plants that benefit from mycorrhizal fungi)

Books:

Deep Rooted Wisdom, Skills and Stories from Generations of Gardeners, Augustus Jenkins Farmer

Teaming with Microbes, Jeff Lowenfels and Wayne Lewis

Teaming with Nutrients, Jeff Lowenfels

Teaming with Fungi, Jeff Lowenfels

Dirt to Soil, Gabe Brown

Definitions:

Mycorrhizazae -is a symbiotic association between a fungus and the roots of a vascular host plant; naturally occurring beneficial fungi that form symbiotic relationships with plants, attaching to roots and becoming an extension of the plant root system

—endomycorrhizal fungi - a type of mycorrhiza in which the fungus penetrates the cortical cells of the roots of a vascular plant.

—ectomycorrhizal fungi - are typically formed between the roots of around 10% of plant families, mostly woody plants including the birch, dipterocarp, eucalyptus, oak, pine, and rose families, consisting of a hyphal sheath, or mantle, covering the root tip and a hartig net of hyphae surrounding the plant cells within the root cortex.

Hyphae - each of the branching filaments that make up the mycelium of a fungus.

glomalin - a glycoprotein produced abundantly on hyphae and spores of arbuscular mycorrhizal (AM) fungi in soil and in roots; discovered in 1996.

soil aggregates - are groups of soil particles that bind to each other more strongly than to adjacent particles. The space between the aggregates provide pore space for retention and exchange of air and water.

permaculture - the development of agricultural ecosystems intended to be sustainable and self-sufficient.

Follow these 16 steps and you'll be the best gardener you know
By Todd Heft | January 4, 2013

1. I will not use synthetic fertilizers
   Synthetic fertilizers are harmful to the ecosystem in your lawn and garden. Your lawn, if healthy, rarely needs any kind of store-bought fertilizer. In fact, much of the fertilizer poured onto lawns in spring and fall is completely wasted – it doesn't even make it to the roots of the grass, but runs off into local waterways where the high nitrogen content causes algal blooms and makes water undrinkable. Contrary to every spring's marketing barrage, all your lawn really needs is the finely ground grass clippings created by your mower's mulching blade. In the case of your flower or vegetable garden, once established it should only be treated with organic boosters like compost, fish emulsion, manures, blood meal or bone meal, and only when necessary.

2. I will not use herbicides
   Herbicides were invented for large scale industrial agriculture use. Because they were so effective and popular, they trickled down to the professional landscape community and then to consumers. This has resulted in an annual use of literally hundreds of millions of pounds of glyphosate (active ingredient in Roundup) and other weed killers being used often incorrectly in farm fields, yards, and gardens. Farm workers have been known to suffer serious health consequences from repeated exposure to these chemicals and super weeds are now taking over farm fields, having grown resistant to the chemicals. In your garden, herbicides are rarely necessary and the most effective weeding is accomplished by hand. In your lawn, create conditions to allow your grass to thrive and it will crowd out unwanted weeds. Read more about organic weed control for your garden and lawn.

3. I will not use insecticides
The best insect control doesn't come in a bottle. A garden and lawn ecosystem in balance is home to birds, companion plants, and insect life which support each other and keep one another in check. Companion plants discourage pests and birds will eat their weight in insects each day. Insecticides can throw that balance out of whack, favoring one species over another, and once the balance shifts an infestation may occur. A lawn and garden treated with no synthetic chemicals is remarkably balanced and free of pests and disease. It's also a lot safer for you.

4. I will not waste water
Much of the U.S. is still in drought (check the drought monitor here) and in the coming years meteorologists predict that dry spells and heat extremes will become more frequent. Those who live where rainfall has always been plentiful may have to learn to make due with less. Use rain barrels to catch water from your roof. Only water your garden and lawn when necessary. Water the root zones of your garden plants, not from overhead. Use native plants which can tolerate your local weather cycles. Use mulches and ground covers to retain soil moisture. Create a healthy ecosystem in your lawn to catch storm runoff.

5. I will start a compost pile
Compost is the magic ingredient for your flower or vegetable garden, breaking down into humic acids which feed the plants. Compost can also be added to your lawn, as long as it's properly finished – nice and loamy. Create a pile of

kitchen scraps, lawn clippings, bush trimmings, leaves, and other organic material, let it break down, and add it to your garden soil in spring and fall. Or buy it bagged from your local garden center. Read about how to make compost and how to build a starter compost bin.

6. I will start a raised garden bed
Raised garden beds retain moisture better than flat beds and allow for better weed control. Plants are also grown closer together, which increases your yield per square inch. The height of the raised garden bed helps the soil to warm earlier in spring so you can get a head start, and since this garden soil isn't walked on, no compaction occurs, allowing plant roots to dig deep, which keeps them healthy. Learn how to build a raised garden bed.

7. I will eat what I grow and donate what I don't eat
Roughly forty percent of the food grown in America ends up in the waste stream. If you're growing it, you probably intend to eat it, but if a bumper crop comes in and you have too much, donate the extra to a food pantry or share it with neighbors.

8. I will grow companion plants
Companion plants, also known as beneficials, can be used to encourage higher yields of vegetables and fruit, and to discourage pests. For instance, planting marigolds with tomatoes discourages root nematodes; geraniums repel Japanese beetles and cabbage worms; horseradish discourages Colorado potato beetles. Here's a great list of companion plants and their uses.

9. I will learn which "weeds" are beneficial

10. I will use native plants in my flower garden

11. I will protect bees and invite pollinators into my garden
These three can almost be thought of as one, because they are so closely

related. For instance, clover, treated like a weed by lawn care companies for the past 60 years, is now recognized as important for your lawn, as it withstands drought and heat and sequesters nitrogen for the surrounding grass. That's the very definition of "beneficial". Some weeds that volunteer in your garden are edible, some can act as ground covers, and others may act as hosts for beneficial insects. Many of these "weeds" are also local (native) species, acting as hosts for the butterfly's life cycle, nectar sources for hummingbirds , and attracting and supporting native bee populations. Without pollinators, many of our garden crops would produce low yields or none at all and many of our flowers would never produce a second generation or the spectacular blooms we love them for. As so many bee colonies have disappeared, it's essential that we create chemical-free environments for them in our gardens. Here's a list of beneficial weeds for your lawn and garden.

12. I will protect my garden soil with mulch, cover crops, and ground covers
Protecting your soil is absolutely essential. Mulches, cover crops, and ground covers insulate the soil, help to retain moisture, prevent nutrients from washing out, conserve water, and help your plants resist drought. In the case of cover crops, they also add organic material to the soil when tilled in. During winter, mulches, cover crops, and ground covers protect your soil from frost heave and stop erosion from harsh winter weather. Ground covers may also serve as companion plants.

13. I will create a backyard wildlife habitat
Even if you live in the middle of a city, you can create a space to attract and protect local wildlife – birds, rabbits, squirrels, beneficial insects. Planting native species is one of the best ways to do this. If your yard is large enough, create this space as far away from your food and flower garden as possible, to minimize wildlife snacking on your favorite plants.

14. I will use a mulching blade on my lawnmower
A mulching blade on your mower shreds and chops the grass and deposits it at soil level. As the finely cut grass decomposes it releases nitrogen, which is the only chemical your grass needs. The decomposing grass also serves as a mulch, protecting your lawn during drought and extreme heat.

15. I will cut my lawn only when it's dry and three inches tall
Cutting a wet lawn results in shredded and torn grass, making it vulnerable to fungal infections – plus it looks really bad and seriously dulls your lawnmower's blade. No more than 1/3rd of the height of the grass should be mowed, so if you like it two inches, don't cut it until it reaches 3''. A taller grass allows for deeper root growth and shading out of weed seeds.

16. I will learn to love the clover in my lawn
Clover restores nitrogen to your soil which benefits the grass. It's also more resistant to drought and heat stress than the grasses in your lawn. Look here for tips on keeping your lawn green organically.
http://www.bigblogofgardening.com/take-the-better-gardener-pledge/