Masanobu fukuoka one straw revolution pdf free pdf file

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White Clover – This is what my living mulch should soon look like. Photo by Martin LaBarsI mentioned in my post about building raised beds that I chose to add New Zealand white clover to the edges of the raised bed to act as a living mulch. First off, I should explain what a living mulch is, and how it differs from a cover crop:“In agriculture, a living mulch is a cover crop interplanted or undersown with a main crop, and intended to serve the purposes of a mulch, such as weed suppression and regulation of soil temperature. Living mulches grow for a long time with the main crops, whereas cover crops are incorporated into the soil or killed with herbicides.” Definition from Wikipedia.6 Reasons Why I Chose Clover as a Living Mulch:So essentially, what I’m doing is allowing the clover to grow on the edges of my raised beds initially. If it travels its way into the beds, that’s OK with me. Here’s why:1. Less WeedingIt will prevent most weeds and grasses from forming on the walls of the raised bed2. Retains MoistureJust like normal mulches, the clover will retain moisture in the soil by absorbing all of the sun before it hits the soil3. Withstands TrafficIt should be able to withstand the occasional traffic involved in reaching into the garden beds4. Nitrogen FixerIt will fix nitrogen into the soil, which in turn benefits the plants in the raised bed5. Improves Soil TilthClover’s root system improves the friability of soil almost immediately6. Attracts PollinatorsClover attracts bees, who will hopefully stick around and pollinate my fruiting vegetables as well as my nearby fruit trees & bushes(These 6 reasons are also a great example of the permaculture concept of stacking functions – more on that later.)But Isn’t Clover a Weed?I have had a few people ask me why I would add clover to a yard, because they thought it was a weed. First off, clover is only a weed if your goal is 100% grass. If that’s your goal, read this article on how to have a beautiful organic lawn. View this post on InstagramA post shared by @_emily__turner_ I personally like the appearance of clover better than grass. Clover does have aggressive tendencies: it spreads quickly and can block out other growth. My clover will be used in a place where it is surrounded by a wood chip pathway on one side, and a garden bed on the other. If the clover gets into the garden bed, that’s OK with me. I can always pull back the area of clover where I want a plant to be and then plant. In the meantime, all of the area covered with clover will be getting a dose of nitrogen and will be relatively protected from weeds.Also, I mentioned in my post on raised beds that much of my current garden bed soil will eventually be moved around. When that happens, the clover will get mixed in as a normal cover crop would, and will improve the soil than as well.Doesn’t It Compete With Other Plants for Nutrients?Yes, a little bit, but that’s OK. First off, I take good care of my soil with plenty of organic materials and other natural amendments throughout the year, so the soil shouldn’t be lacking for nutrients. As mentioned above, if the clover ever gets in my way, I can just rip it out by the handful and whatever I’m planting will have plenty of space. Furthermore, I’m a firm believer that planting polycultures (many plants all grouped together) will always do better than monocultures (think big corn fields with nothing else growing). On a side note, here’s a good read about polycultures being more productive than monocultures from a recent study at the Virginia Institute of Marine Science:“…analysis shows that plant communities with many different species are nearly 1.5 times more productive than those with only one species (such as a cornfield or carefully tended lawn), and ongoing research finds even stronger benefits of diversity when the various other important natural services of ecosystems are considered. Diverse communities are also more efficient at capturing nutrients, light, and other limiting resources.”(Source: ScienceDaily.com via Virginia Institute of Marine Science)How to Plant the Clover:I used a broadcast method (aka scattering the seeds) to add them to my raised bed walls. If you use a broadcast method, be certain to do it (A) in your rainy season when the heat is gone or (B) cover it with a light layer of soil. If the seeds dry out or sit in the sun to bake, they won’t germinate well. In my picture, you can see the seeds that fell into soil cracks were the only ones that performed well.White Clover Seeds Germinating – You can see that the seeds that fell into cracks in the soil were much more likely to start. I seeded right before a hot and dry week unfortunately, so I learned this the hard way – Keep Your Clover Moist While It Germinates!Where Did I Get This Idea?There’s nothing new about it. People have been using clover as a cover crop for a long time. Masanobu Fukuoka wrote extensively about using white clover specifically as a living mulch, so he gets full credit for what I’m doing. Here’s a good article by permaculturalist Larry Korn (the man who translated Fukuoka’s book, The One-Straw Revolution, into English) about Fukuoka’s farming method.Where Did I Get The Clover Seed?I purchased 1 lb of it with my seed order at Territorial Seed Co. this year specifically for this purpose. The exact type I bought was New Zealand White Clover, which cost $11 per pound of seed.More Information about New Zealand White Clover:Territorial Seed Description: Trifolium repens – Growing to only 8 inches, this low perennial clover has a growth habit similar to White Dutch Clover but will stand drought conditions better, is more vigorous, and tolerates a wide range of soils. Used for both a spring and fall cover crop, New Zealand White Clover can be sown between row plantings or as a solid seeded cover. A terrific green manure as it fixes up to 170 pounds of nitrogen per acre and attracts beneficial insects. Sow 1/4 pound per 1000 square feet; 6–10 pounds per acre. Pre-inoculated.Interesting White Clover Factoids:Initial taproot may grow to 3 feet deep.Regenerates itself both by seed and by spreading vegetative growth.Grows on a range of soils, but better on clay and loam than on sand.Decent tolerance of shade, heat, flooding, and drought (all important here in Seattle).Depending on moisture availability, can produce about 1 to 3 tons of dry matter per acre, containing 80 to 200 lbs of nitrogen per acre.When growing white clover, farmers should see immediate improvement in the top soil. White clover’s extensive root system make the soil more friable, improving tilth and water infiltration.Susceptible to potato leafhopper, meadow spittlebug, clover leaf weevil, alfalfa weevil, and lygus bug. Slugs will also attack white clover.Competition with your primary crops can be reduced by mowing and hand pulling back the clover. Competition may be higher during drought periods.(Source: University of Hawai’i PDF, See Below)For More Information on White Clover:Excellent PDF Download from University of Hawai’i about White Clover: (Download Clover PDF)Great Article on White Clover by Sustainable Agriculture Research & Education: (White Clover)Photo Credit: Martin LaBar Conservation and rehabilitation approach to food and farming systems Biodiversity Regenerative agriculture is a conservation and rehabilitation approach to food and farming systems. It focuses on topsoil regeneration, increasing biodiversity,[1] improving the water cycle,[2] enhancing ecosystem services, supporting biosequestration,[3] increasing resilience to climate change, and strengthening the health and vitality of farm soil. Regenerative agriculture is not a specific practice itself. Rather, proponents of regenerative agriculture use a variety of sustainable agriculture techniques in combination.[4] Practices include recycling as much farm waste as possible and adding composted material from sources outside the farm.[5][6][7][8] Regenerative agriculture on small farms and gardens is often based on philosophies like permaculture, agroecology, agroforestry, restoration ecology, keyline design, and holistic management. Large farms tend to be less philosophy driven and often use "no-till" and/or "reduced till" practices. As soil health improves, input requirements may decrease, and crop yields may increase as soils are more resilient against extreme weather and harbor fewer pests and pathogens.[9] Most plans to mitigate climate change focus on "reducing greenhouse gas emissions." Regenerative agriculture, i.e. the capture of atmospheric carbon dioxide by growing plants that move that carbon dioxide into the soil, is pretty nearly the only currently-functioning technology available for drawing down greenhouse gases that are already in the atmosphere, mostly through the cultivation and nurturing of forests and permanent perennial pastures and grasslands. Hoverfly at work History Rodale Institute, Test Garden Origins Regenerative agriculture is based on various agricultural and ecological practices, with a particular emphasis on minimal soil disturbance and the practice of composting.[10] Maynard Murray had similar ideas, using sea minerals.[11][12] His work led to innovations in no-till practices, such as slash and mulch in tropical regions.[13][14][15] Sheet mulching is a regenerative agriculture practice that smothers weeds and adds nutrients to the soil below.[16][17] Field in Hamois, Belgium In the early 1980s, the Rodale Institute began using the term ‘regenerative agriculture’.[18] Rodale Publishing formed the Regenerative Agriculture Association, which began publishing regenerative agriculture books in 1987 and 1988.[19] By marching forward under the banner of sustainability we are, in effect, continuing to hamper ourselves by not accepting a challenging enough goal. I am not against the word sustainable, rather I favor regenerative agriculture.— Robert Rodale However, the institute stopped using the term in the late 1980s, and it only appeared sporadically (in 2005[20] and 2008), until they released a white paper in 2014, titled "Regenerative Organic Agriculture and Climate Change".[21] The paper's summary states, "we could sequester more than 100% of current annual CO2 emissions with a switch to common and inexpensive organic management practices, which we term 'regenerative organic agriculture.'" The paper described agricultural practices, like crop rotation, compost application, and reduced tillage,[21] that are similar to organic agriculture methods. Newly planted soybean plants are emerging from the residue left behind from a prior wheat harvest. This demonstrates crop rotation and no-till planting. In 2002, Storm Cunningham documented the beginning of what he called "restorative agriculture" in his first book, The Restoration Economy. Cunningham defined restorative agriculture as a technique that rebuilds the quantity and quality of topsoil, while also restoring local biodiversity (especially native pollinators) and watershed function. Restorative agriculture was one of the eight sectors of restorative development industries/disciplines in The Restoration Economy.[22] Recent developments (since 2010) Indigenous cultures have long been privy to the innate knowledge of many of regenerative agriculture's techniques. These practices have existed for centuries, but the term itself has only been around for some decades, and as of late, has increasingly showed up in academic research since the early to mid 2010s in the fields of environmental science, plant science, and ecology.[23] As the term expands in use, many books have been published on the topic and several organizations started to promote regenerative agriculture techniques. Allan Savory gave a TED talk on fighting and reversing climate change in 2013. He also launched The Savory Institute, which educates ranchers on methods of holistic land management. Abe Collins created LandStream to monitor ecosystem performance in regenerative agriculture farms.[24] Eric Toensmeier had a book published on the subject in 2016.[25] However, researchers at Wageningen University in the Netherlands found there to be no consistent definition of what people referencing "regenerative agriculture" meant. They also found that most of the work around this topic were instead the authors' attempt at shaping what regenerative agriculture meant.[4] Founded in 2013, 501(c)3 non-profit Kiss the Ground was one of the first to publicize the term to a broader audience. Today the group runs a series of media, farmland, education, and policy programs to raise awareness around soil health and support farmers who aim to transition from conventional to regenerative land management practices. Kiss the Ground the film narrated by Woody Harrelson was released on Netflix in 2020. Soil Health Academy and Farmers Footprint are among other educational platforms based in the United States. Several large corporations have also announced regenerative agriculture initiatives in the last few years. In 2019, General Mills announced an effort to promote regenerative agriculture practices in their supply chain. The farming practices have received criticism from academic and government experiments on sustainability in farming. In particular, Gunsmoke Farm partnered with General Mills to transition to regenerative agriculture practices and become a teaching hub for others. Experts from the area have expressed concerns about the farm now doing more harm than good, with agronomist Ruth Beck stating that "Environmental marketing got ahead of what farmers can actually do".[26] In February 2021, the regenerative agriculture market gained traction after Joe Biden's Secretary of Agriculture Tom Vilsack made reference to it during his Senate Confirmation hearing. The Biden Administration wants to utilize $30 billion from the USDA's Commodity Credit Corporations to incentive farmers to adopt sustainable practices.[27] Vilsack stated in the hearing, "It is a great tool for us to create the kind of structure that will inform future farm bills about what will encourage carbon sequestration, what will encourage precision agriculture, what will encourage soil health and regenerative agricultural practices."[28] After this announcement from the Biden Administration, several national and international corporations announced initiatives into regenerative agriculture.[29][30][31] During the House of Representatives Committee on Agriculture's first hearing on climate change, Gabe Brown, a proponent of regenerative agriculture, testified about the role of regenerative agriculture in both the economics and sustainability of farming.[32] In 2021, PepsiCo announced that by 2030 they will work with the farmers in their supply chain to establish regenerative agriculture practices across their approximately 7 million acres.[33][31] In 2021, Unilever announced an extensive implementation plan to incorporate regenerative agriculture throughout their supply chain.[30][34] VF Corporation, the parent company of The North Face, Timberland, and Vans, announced in 2021 a partnership with Terra Genesis International to create a supply chain for their rubber that comes from sources utilizing regenerative agriculture.[29][35] Nestle announced in 2021 a $1.8 billion investment in regenerative agriculture in an effort to reduce their emissions by 95%.[36] A recent trend of small-scale farmers have been taking the lead in adopting regenerative agriculture principles. Most notably, Farmer Jeff Siewicki of Regenerative Success, teaches farmers how to heal the land through successful regenerative practices that focus on melding positive environmental and financial outcomes. Siewicki's focus is on "Practical regenerative solutions to ensure environmental, financial, and social stability" Principles There are several individuals, groups, and organizations that have attempted to define what the principles of regenerative agriculture are. In their review of the existing literature on regenerative agriculture, researchers at Wageningen University created a database of 279 published research articles on regenerative agriculture.[4] Their analysis of this database found that people using the term regenerative agriculture were using different principles to guide regenerative agriculture efforts.[4] The 4 most consistent principles were found to be, 1) enhancing and improving soil health, 2) optimization of resource management, 3) alleviation of climate change, and 4) improvement of water quality and availability. Notable definitions of principles The organization The Carbon Underground created a set of principles that have been signed on to by a number of non-profits and corporations including Ben & Jerry's, Annie's, and the Rodale Institute, which was one of the first organization to use the term "Regenerative Agriculture".[37] The principles they've outlined include building soil health and fertility, increase water percolation and retention, increasing biodiversity and ecosystem health, and reducing carbon emissions and current atmospheric CO2 levels.[37] The group Terra Genesis International based in Thailand, and VF Corporation's partner in their regenerative agriculture initiative, created a set of 4 principles, which include:[38][5] "Progressively improve whole agroecosystems (soil, water and biodiversity)" "Create context-specific designs and make holistic decisions that express the essence of each farm" "Ensure and develop just and reciprocal relationships amongst all stakeholders" "Continually grow and evolve individuals, farms, and communities to express their innate potential" Practices Practices include but are not limited to:[7][5][39][40] Permaculture design Aquaculture[41] Agroecology[41] Agroforestry[5] Soil food web Livestock: well-managed grazing,[7] animal integration[5] and holistically managed grazing[5] Keyline subsoiling Conservation farming, no-till farming, minimum tillage,[7] and pasture cropping[5] Cover crops & multi-species cover crops[7] Organic annual cropping[5] and crop rotations[7] Compost, compost tea,[5] animal manures[7] and thermal compost Natural sequence farming Grass-fed livestock Polyculture and full-time succession planting of multiple and inter-crop plantings[7] Borders planted for pollinator habitat and other beneficial insects[7] Biochar/terra preta[5] Ecological aquaculture[5] Perennial crops[5] Regenerative ocean farming[42] Silvopasture[5] Alternative food networks (AFNs), commonly defined by attributes such as the spatial proximity between farmers and consumers.[43] Home gardens, to mitigate the adverse effect of global food shocks and food price volatilities. Consequently, there is much attention towards home gardens as a strategy to enhance household food security and nutrition.[44] Regrowing vegetables, for recycling and sustainable living.[45] Environmental impacts Carbon sequestration Conventional agricultural practices such as plowing and tilling release carbon dioxide (CO2) from the soil by exposing organic matter to the surface and thus promoting oxidation.[46] It is estimated that roughly a third of the total anthropogenic inputs of CO2 to the atmosphere since the industrial revolution have come from the degradation of soil organic matter[46] and that 30–75% of global soil organic matter has been lost since the advent of tillage-based farming.[47] Greenhouse gas (GHG) emissions associated with conventional soil and cropping activities represent 13.7% of anthropogenic emissions, or 1.86 Pg-C y−1.[47] The raising of ruminant livestock also contributes GHGs, representing 11.6% of anthropogenic emissions, or 1.58 Pg-C y−1.[47] Furthermore, runoff and siltation of water bodies associated with conventional farming practices promote eutrophication and emissions of methane.[47] Regenerative agriculture practices such as no-till farming, rotational grazing, mixed crop rotation, cover cropping, and the application of compost and manure have the potential to reverse this trend. No-till farming reintroduces carbon back into the soil as crop residues are pressed down when seeding. Some studies suggest that adoption of no-till practices could triple soil carbon content in less than 15 years.[46] Additionally, 1 Pg-C y−1, representing roughly a fourth to a third of anthropogenic CO2 emissions,[48] may be sequestered by converting croplands to no-till systems on a global scale.[46] Regenerative grazing management, particularly adaptive multipaddock (AMP) grazing, has been shown to reduce soil degradation compared to continuous grazing and thus has the potential to mitigate carbon emissions from soil.[47] Crop rotation and maintenance of permanent cover crops help to reduce soil erosion as well, and in conjunction with AMP grazing, may result in net carbon sequestration.[47] One study suggests that total conversion of livestock raising to AMP grazing practices coupled with conservation cropping has the potential to convert North American farmlands to a carbon sink, sequestering approximately 1.2 Pg-C y−1.[47] Over the next 25–50 years, the cumulative sequestration potential is 30-60 Pg-C. Additions of organic manures and compost further build soil organic carbon, thus contributing to carbon sequestration potential.[48] A research made by the Rodale institute suggests that a worldwide transition to regenerative agriculture can soak more than 100% of the CO2 currently emitted by people.[49] Nutrient cycling Soil organic matter is the primary sink of nutrients necessary for plant growth such as nitrogen, phosphorus, zinc, sulfur, and molybdenum.[48] Conventional tillage-based farming promotes rapid erosion and degradation of soil organic matter, depleting soil of plant nutrients and thus lowering productivity.[46] Tillage, in conjunction with additions of inorganic fertilizer, also destroys soil microbial communities, reducing production of organic nutrients in soil.[46] Practices that restore organic matter may be used to increase the total nutrient load of soil.[48] For example, regenerative management of ruminant livestock in mixed-crop and grazing agroecosystems has been shown to improve soil nutrient cycling by encouraging the consumption and decomposition of residual crop biomass and promoting the recovery of nitrogen-fixing plant species.[47] Regenerative crop management practices, namely the use of crop rotation to ensure permanent ground cover, have the potential to increase soil fertility and nutrient levels if nitrogen-fixing crops are included in the rotation.[47] Crop rotation and rotational grazing also allow the nutrients in soil to recover between growing and grazing periods, thus further enhancing overall nutrient load and cycling.[48] Biodiversity Conventional agricultural practices are generally understood to simplify agroecosystems through introduction of monocultures and eradication of diversity in soil microbial communities through chemical fertilization.[50] In natural ecosystems, biodiversity serves to regulate ecosystem function internally, but under conventional agricultural systems, such control is lost and requires increasing levels of external, anthropogenic input.[50] By contrast, regenerative agriculture practices including polycultures, mixed crop rotation, cover cropping, organic soil management, and low- or no-tillage methods have been shown to increase overall species diversity while reducing pest population densities.[50] Additionally, practices that favor organic over inorganic inputs aid in restoring below-ground biodiversity by enhancing the functioning of soil microbial communities.[48] A survey of organic and conventional farms in Europe found that on the whole, species across several taxa were higher in richness and/or abundance on organic farms compared to conventional ones, especially species whose populations have been demonstrably harmed as a direct result of conventional agriculture.[51] AMP grazing can help improve biodiversity since increased soil organic carbon stocks also promotes a diversity of soil microbial communities.[47] Implementation of AMP in North American prairies, for example, has been correlated with an increase in forage productivity and the restoration of plant species that had previously been decimated by continuous grazing practices.[47] Furthermore, studies of arid and semiarid regions of the world where regenerative grazing has been practiced for a long time following prior periods of continuous grazing have shown a recovery of biodiversity, grass species, and pollinator species.[47] Criticism Some members of the scientific community have criticized as exaggerated and unsupported by evidence some of the claims made by proponents of regenerative agriculture.[52] One of the prominent proponents of regenerative agriculture, Allan Savory, claimed in his TED talk that holistic grazing could reduce carbon-dioxide levels to pre-industrial levels in a span of 40 years. According to Skeptical Science: "it is not possible to increase productivity, increase numbers of cattle and store carbon using any grazing strategy, never-mind Holistic Management [...] Long term studies on the effect of grazing on soil carbon storage have been done before, and the results are not promising.[...] Because of the complex nature of carbon storage in soils, increasing global temperature, risk of desertification and methane emissions from livestock, it is unlikely that Holistic Management, or any management technique, can reverse climate change.[53]" According to a 2016 study published by the Swedish University of Agricultural Sciences, the actual rate at which improved grazing management could contribute to carbon sequestration is seven times lower than the claims made by Savory. The study concludes that holistic management cannot reverse climate change.[54] A study by the Food and Climate Research Network in 2017 concluded that Savory's claims about carbon sequestration are "unrealistic" and very different from those issued by peer-reviewed studies.[52] Tim Searchinger and Janet Ranganathan have expressed concerns about emphasis upon "Practices That Increase Soil Carbon at the Field Level" because "overestimating potential soil carbon gains could undermine efforts to advance effective climate mitigation in the agriculture sector." Instead Tim Searchinger and Janet Ranganathan say, "preserving the huge, existing reservoirs of vegetative and soil carbon in the world’s remaining forests and woody savannas by boosting productivity on existing agricultural land (a land sparing strategy) is the largest, potential climate mitigation prize of regenerative and other agricultural practices. Realizing these benefits requires implementing practices in ways that boost productivity and then linking those gains to governance and finance to protect natural ecosystems. In short, produce, protect and prosper are the most important opportunities for agriculture."[55] See also Agroecological restoration Agroecology Agroforestry Biointensive agriculture Carbon farming Farmer-managed natural regeneration Korean natural farming Permaculture Regenerative design External links Regenerative Success Learning from Nature Kiss the Ground at IMDb "Regenerative Agriculture". Regeneration.org. 2021. VicNoTill at Horsham, Victoria. No-Till Regenerative Farming Systems Australia. References ^ "Our Sustainable Future - Regenerative Ag Description". csuchico.edu. Retrieved 2017-03-09. ^ Underground, The Carbon; Initiative, Regenerative Agriculture; CSU (2017-02-24). "What is Regenerative Agriculture?". Regeneration International. Retrieved 2017-03-09. ^ Teague, W. 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