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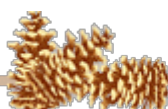
TREE FARM BULLETIN

Ruminations on Forest Soil Health in New Mexico

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For decades, my wife Johanne and I have collected wild edible mushrooms for our table and consequently have amassed a small library of mushroom identification books. Being the curious sort and finding everything about mushrooms “curiouser and curiouser” ... this led me about 5 years ago to the work of one of the prominent mycologists (fungal biologist) of our time... Paul Stamets. An internet search on his name will produce a mind-blowing day of eye candy as well as deep food for thought! After carefully reading his most famous book, *Mycelium Running* (2005), and with paying special attention to Chapter 6, “Mycoforestry”. I was struck by Stamets compelling argument for the efficacy of chipping slash over burning slash for the restoration of the nutrient richness of our forest soils. According to Stamets, abundant saprophytic (decomposing) forest fungi, coupled with an army of microorganisms (e.g., soil inhabiting bacteria), wood chips are very quickly transformed from above ground, wildfire prone carbon into below ground fire retardant, moisture retaining humus*. I decided to quit burning our slash piles produced by our annual thinning programs and instead invest in a chipper. The last 5 years of chipping have resulted in an intense self-tutorial on forest soils and a sharpening of my observations about the interrelation between fungi, other microorganisms, forest duff and our grasses, forbs and trees... a rumination on forest soil health in New Mexico.

I've heard it said that master gardeners don't take care of their plants...they take care of the soil and the soil takes care of the plants. Recently, while cutting up a very old and very twisted Ponderosa that fell victim to bark beetles, I had an epiphany. As I lifted a large diameter section that had laid (living) on the forest floor for, I'm guessing, 100 years or more, I saw that beneath this section was a pad of top soil with an “antique” topping of pine needles that hadn't been



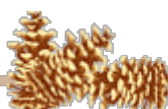
disturbed in all that time... a time capsule if you will. What was jaw dropping was the fact that the rich humus soil was at least 8" thick! Not two feet away in any direction or across our 40 acres would you find top soil under the pine needle duff that was 1" thick. I couldn't help wondering "what happened". The history of our tree farm includes the cutting of the virgin stand just after 1900 with it's attendant dragging of large logs to the rail line (that ran the length of our property) as well as a second cutting for saw logs in the 1950's. There was also the extreme over-grazing of our forest grasses in the early to mid-1900's by thousands of sheep followed by cattle and even donkeys! I can only surmise that these "practices" coupled with erosion and the continual removal of carbon (saw logs, firewood, and burned slash) from the woodlands led to the depletion of soils to the point that we still have large patches of mineral soil with no plant life what-so-ever, baked by the sun and washed clean by the rain.

A second fortuitous awakening occurred about 4 years ago when I decided I wanted to try growing blueberries...again. My first trial ended when my plants were smaller the second year and gave up trying on the third. I've since learned that blueberries need acidic soil (4.5-6 pH) and our mineral soil is 7.5 or more pH! At the time, we had two young aspiring permaculture enthusiasts living in our back cottage and they suggested I look into something called hugelkultur. I know, I didn't know what that was either! So, I Goggled it (<https://en.wikipedia.org/wiki/H%C3%BCgelkultur> and <https://richsoil.com/hugelkultur/> and had another epiphany! It seems this is something permaculture folks, especially in Europe, have been experimenting with for a while. It's a method of turning a waste product, small diameter logs and branches, into rich top soil (more acidic if one uses pine logs) by encouraging fungi and microorganisms already in our soil and soil litter. This sounded too good to be true so I had to try it.



In the photo to the left you can see fresh cut, small diameter Ponderosa pieces stacked closely, about 30" deep, and interspersed with wood chips. I left 4 cavities for the blueberry plants embedded in

peat moss and the whole thing topped with a couple inches of forest topsoil and more chips. The photo to the right shows the newly planted blueberry whips. I can happily report now, 4 years later, that the plants are 3-4 feet tall, very bushy and bare beautiful, abundant juicy berries. It seems the mycelium (the underground



body of fungi, the mushrooms are just the reproductive structures!) and its allies have transformed the wood into a moisture retaining, more acidic medium somewhere on its way to becoming top soil. I'm looking forward to digging a test pit in the center of this raised bed sometime this Spring to check on it's progress.

At the same time, I constructed this blueberry hügelkultur structure I thought I'd try an experiment and make a hügelkultur "carbon raft" to see if I could jump start thicker forest top soil on a patch of thin depleted soil.

To the right is a photo of the construction of the "carbon raft" in progress.

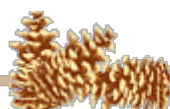
I also inoculated these Ponderosa logs with the mycelium of a tasty Oyster mushroom variety known to grow on pine logs. I also planted a small

Gooseberry seedling in the raft to see how it would do with no further attention. I can report that 4 years later the Gooseberry seedling is still

slowly growing without the aid of any additional watering and that last summer I was able to harvest Oyster mushrooms twice from this patch (photo below). Again, I look forward to digging a test pit in the "raft" this Spring to see how the log-to-topsoil progress is going.

These experiments and my experience and observations with substituting chipping for burning slash have led me to thinking about the importance of returning as much carbon as possible to our

seriously depleted forest soils. Data suggests that as much as 50% of forest humus is soil organic carbon (SOC). This SOC is created by the action of various fungi in concert with microorganisms acting on woody matter as it comes into contact with the soil. In addition, the data suggests that the growing vigor and the ultimate size of our forest trees is determined, at least in part, by the richness of the nutrients in our forest humus. I've since done a bit



of research on the forest carbon cycle with an emphasis on carbon sequestration in SOC. Here are a few websites I found particularly interesting... <https://www.fs.usda.gov/ccrc/topics/forest-soil-carbon> and <https://www.fs.usda.gov/ccrc/sites/default/files/carboncourse/potential-sequestration.html>. It seems to me that we might have a once-in-a-lifetime opportunity to convert the overabundance of carbon build-up above ground in our overstocked forests into the restoration of carbon rich nutrients (SOC) below ground in our carbon depleted forest soils. It would be sad indeed to watch this historic opportunity go up in smoke. The question is, it seems to me, how can the “best practices” for tree farmers encourage this transformation? I look forward to participating in a discussion along these lines with someone engaged in forest soils research.

**Humus – black or brown organic material of complex composition which is the end-product of microbial breakdown of plant and animal residues at the soil surface.*

1) BUY, SELL OR TRADE

Are you looking for forestry related equipment to buy (i.e. chipper, splitter, chainsaw, etc.)? Or, do you own forestry related equipment you would like to sell or trade? Forestry related equipment only, please, no homes or land. We would like to help you make the connection with other New Mexico Tree Farmers. Provide us with a description of the equipment, price, photo and contact information and we will post it in the New Mexico Tree Farm Bulletin. If you would like us to help you make the connection please provide information to Arnie Friedt at arnie.friedt@state.nm.us

2) COMMUNITY CORNER

If your community is having a forestry related public event let us know the details and we would be delighted to promote your event in the New Mexico Tree Farm Bulletin. Give us the event details, Who, What, Where and When with contact information and we will include in our monthly bulletin. If you would like us to help you promote your event, please provide information to Arnie Friedt at arnie.friedt@state.nm.us

3) NEW WEBSITE

Our new website is at <https://www.treefarmssystem.org/new-mexico> . Current feature includes: contact information, resources, newsletters, bulletins, news and our calendar of events. Take a few minutes and check out our new website (provided to us by the American Tree Farm System).

4) COMMITTEE MEETING

All Tree Farmers are invited and encouraged to attend our 1st New Mexico Tree Farm Committee Meeting of the year (three held annually). Please join us at 1:30 pm on Wednesday, March 8, 2017. Meeting location to be determined. Come out and hear what other tree farmers have been up to and share your tree farm accomplishments with the group. We look forward to visiting with you. If you have any questions, please contact Arnie Friedt at arnie.friedt@state.nm.us

