Walden Heights Nursery & Orchard 10/18/21

Report for Consultation Visit Sarah Spira 218 Scott Highway, Groton VT

Site: Located in Groton VT (at 44.204946 -72.174548). Homestead sits roughly at 800 feet, rising to 1000 feet progressing generally to the north. Aspect approximately descending to the south.

Soils: Those in this region tend to be loose, well drained soils. Source is derived primarily from glacial deposit including outwash terracing/plain (rivers running from melting glaciers). Specifically we have a mix of Adams, Monadnock and Vershire-Lombard complex. The Adams and Monadnock are in the area closer to Scott Highway and to the east. As the land rises to the north/northwest the property is primarily Vershire-Lombard variants. These are all sandy soils, most excessively drained. The differences in the three types is a bit academic due to their similarity. A variation that will usually be encountered is that the V-L soils will be rockier on average, particularly since this is often the case with a rise in elevation due to erosion. Depth to the water table in all areas is likely to be 80 inches or greater. Depth to some restrictive feature (average) will be about that same distance, 80 inches, in the lower areas. As we move north into the Vershire-Lombard soils that depth to bedrock will shrink to half or less (20-40 inches). It is important to keep in mind that data like this is obtained from US geological survey mapping and is meant to be a broad brush. There will always be local variants and some wild anomalies as we focus on small areas. This often places things like glacially deposited stone, clay deposits from terrain variations and water manipulation, etc. What this does tell us is that the overall soil will be well drained, often devoid of nutrients, and often dry.

Soil remediation: The benefits of loose soils like this are the ease of digging, and the freedom from waterlogging. The latter means lower chance of soil born disease as well as workability soon after wet weather or spring melt. The downside is several-fold. Sandier soils tend to be more prone to leaching. This is basic physics, the water carrying nutrients so the sub-strata since the medium is so porous. Restriction tends to trap material, both organic particles and nutrients alike, and sand does not allow for this as well as a heavier soil would. Silts and clays are better at this retention. Obviously this also means that water itself will quickly be depleted through gravity. Not only is it easily drained, but the coarse texture allows for little capillary action to pull moisture back up from below. Another aspect of sandier soil is that it is less able to hold nutrients for later release. Exchange capacity (cation and anion exchange) is the process of particles allowing a temporary “magnetism” of nutrients on their surface (adsorption) that can be somewhat easily released later. This allows banking of nutrients in a soil. Clay particles, and to some degree silt, are able to hold far more nutrients in this suspension than sand. Organic matter also holds this strength, but more on that later. What this all means is that ameliorating this sandy soil in

preferred planting areas will be of great benefit in both holding water and nutrients for better plant growth and health.

Organic matter:

The recommendation for soil improvement in a sandy location is the gradual increase of organic matter, particularly in areas where there is little observable plant growth. Many woody areas will likely have plenty of organic deposit, but additions ,especially in type will be beneficial. In some cases, material can be tilled into the ground, but as can be imagined this can be laborious over large areas. Additionally, tilling does little to bring SOM deep into the substrate. Tilling works nicely if eradicating weeds as well, and for prepping garden areas or more shallow rooted species like strawberries and bramble fruits (raspberries, blackcaps, etc.). For trees and most bushes, most organic matter additions will more economically be added through surface application. Some working into the soil is fine, but most homeowners often limit this to a small proportion of the area due to the labor involved. Surface application will be slow to be incorporated passively, but will occur. The richer and more diverse the material the quicker this will happen. Earthworms, insects, rodents, etc. will bring the organic matter into the soil matrix.

The soil amendments laid on the surface is essentially a mulching program as well. It can aid in suppressing rampant weed growth and competition from grasses. Both surface laid mulch, and the resultant breakdown products filtering into the soil will buffer against drought. These materials are absorbent, holding water themselves but also holding soil together and restraining the quick flow of water through the coarser sand strata.

Let's assume that new plants in the project (and considering the existing apple trees) will be woody perennials like fruit trees, bushes and cane plants or vines. Plants of this type tend to have evolved in forest edge, or forest transitional systems. This means that the soil makeup usually consisted of a high amount of woody debris. Included would be decayed wood, bark, leaves and needles, old bramble canes, and other lignified materials. Simply put all the detritus of a woods system. They also often encountered some proportion of a meadow like system. Imagine a landscape where forest meets open grassland or pasture. Commonly this is where we find fruit species in undisturbed areas. The approach therefore is to approximate the same conditions artificially by providing these materials.

Purchased mulches are usually bark mulches or hammermilled wood waste from lumber or firewood operations. These fit in nicely. For most woody perennial plants we want to lean on the deciduous debris over coniferous. Some of the reasons for this are complicated, but generally speaking they produce different types of fungal systems as they decay. Also, coniferous trees obviously produce a greater acidity and may push

the pH too low for ideal growing conditions. Using higher coniferous (softwood) proportions will however aid growth in acid loving plants like blueberries, lingonberry and others. Most fruit trees and bush fruits enjoy a pH closer to neutral (6.5-6.8) so using hardwood mulches is a wiser move. Any mulching system can use up to 20 percent softwood without deleterious effects.

Wood mulches should not be the only addition however. Included should be some proportion of richer materials- those that break down more readily. It is also important to add as much variety of organic substances as is practical. Possibilities are hay, leaves, grass clippings, biochar, compost, weeds, kitchen waste, manure, and frankly any other organic material.

An important point to bring up at this point is how we deliver the material. As stated, most will be simply laid atop the surface. This actually is preferred when dealing with high carbon materials like wood mulches, dry leaves, etc. The reason is that if amendments with a wide c-n ratio (a lot of carbon and lesser nitrogen), if incorporated into the soil in high amounts can stunt plants by tying up soil nitrogen. This is also the advice given for regular mulching. For instance you can lay deep woody mulch layers on a raspberry or blueberry bed without issue. However if you stir this into the soil you will encounter plant stress. When organic matter breaks down, the microorganisms doing the work steal nitrogen for their processes temporarily. All fine if the soil to mulch interface is limited (as in surface applied mulching). But if everything gets mixed together like making a cake, enough nutrients can be robbed at the moment to cause trouble for plants. That said, some materials, especially those that have fully broken down, are safe. So, for additions that you want to till in you can include good compost, biochar, and fertilizers. All the coarse woody products are what you will use for the topdressing.

In areas were the apples (or other target plants) are receiving woody debris it is likely that richer amendments will benefit. This will particularly be the cases in the denser woodlot locations. As the forest density increases, the preponderance of species will be woody. This means higher carbon materials, which is great, but adding products that break down more quickly and have higher nitrogen content can be beneficial. For instance, if the area around an apple tree is primarily leaf litter, bark, branches, etc. it would benefit from the addition of hay, grass clippings, manure, and some degree of nitrogen containing fertilizer (at least in the first year or two of remediation).

There is a good deal of “product” available in a lot of this size. That is, raw organic material both for mulching and for compost production. Although the landscape generally may benefit from leaving everything as is, in practice it makes more sense to steal material from and area in order to enrich planting areas. Leaves, fine organic debris, weeds, bark, etc. can be gleaned from an area of low importance and become a free amendment for the areas around fruit trees, in berry beds and for garden compost production. This is also a reason that it is important to keep some native species in a nearby location especially deciduous trees. Plants like this will mine nutrients and deposit them on the soil surface as leaves and twig waste, essentially a product

producing mechanism in the landscape. This tends to be sensitive to a landowner's budget (it is easier to buy material than gather it, despite its environmental footprint). I would begin also by keeping your eyes open to locally economical materials. Often spoiled hay, excess manure or bedding, wood chips, etc. are cheaply available if your eyes are open. Craigslist, local pinboards and front porch forum are good bets. Talk with area farmers and tree services too.

General planning:

For the wider layout (both existing and future works), my coaching always is to think about creating an ecosystem. In a nutshell this means being dynamic. For instance, a commercial orchard currently sports a whole lot of grass and dandelions, along with some fruit trees or berry bushes. Not an ecosystem. This is effective, but only because bees are brought in, fertilizers dumped in, and the whole system back-fed from materials elsewhere. Furthermore, a high amount of spraying is needed. A more natural system instead provides habitat for beneficial animals and insects, provides more nutrients in place (essentially for nearly free), and adds a whole lot of beauty to the landscape. Things may be set retentively in rows, or scattered about as interest dictates. Diversity also means a variety of things to eat, both for human and wildlife. The purpose here won't be to dictate what should be planted, but rather that a multitude of species types be present. On your land, many of these things are in place, especially rich at areas where forest meets open land. What you will want to consider in planning is how you can move this to be more productive for your needs. For example you will want to replace some native species with those fit for human food production, aesthetics, or usability. This discussion could also include general thinning or alteration with existing plants. For instance, better timber, firewood production, nitrogen fixation, erosion management, and natural beauty all can be influence by what is left and what is removed, or what is managed physically (pruning, etc.). A local example may be to allow more energy dense firewood species to remain while removing young poplar, pine, etc. that has less value. Generally removing competition from density can allow bush and tree species remaining to thrive (as well as making access/egress easier). These are large discussions, but it is important to remember that as stewards of the land we can have ultimate influence on everything that grows there, and having a conscious consideration of everything can mean both land improvement as well as practical concerns like food and product creation.

As an example, an "orchard" could include fruit trees, fruit bushes, brambles, vines, groundcovers, along with islands or mounds of perennial or annual vegetables, flowers, and so on. A lot of my clients have used alternating rows of different plants. Our own orchard sets islands of bush fruits or other plants between each fruit tree, arranged staggered to look natural. Fences can sport grapevines, hops, and other vines. Besides the obvious variety of fruits and veggies, a varied planting will provide a long feeding opportunity for wildlife. Flowering that runs all season long means pollinators will increase in number. Habitat improvement like this means more

songbirds, beneficial insects, and other animals. Additionally, when other plants are present, more nutrients are cycled. Each plant has a unique makeup, which means it is pulling a variety and proportion of nutrient up from the soil that otherwise may be leached away. They will absorb, incorporate and deposit these materials as they grow and decay (herb cycling, leaf drop, etc.). Thus we create a cycling system in place. In a system like this a great volume of food and plant-life can be created. This is far denser than in most other systems. All this leads to soil improvement as well.

The existing apple trees: I will give some basic thoughts and recommendations here, but this is a larger discussion that will play itself out over the next year.

The trees, across the board need pruning. This includes both removal of dead and disease material as well as a structural manipulation to maintain healthier trees. Without getting into the specifics of tree architecture, pruning, etc. there needs to be an opening up of the canopy to increase airflow and sunlight penetration. There are different options on how to proceed on this front. I can be hired help with the work, I can train both of you, you can attend a workshop here in late winter, or you can do the research yourself with my guidance. Pruning needs to happen during dormancy, ideally in March and April, sometimes a bit later some years, but after the coldest winter temps are abating, and before spring budbreak. Avoid growing season pruning to avoid disease transmission. Fall pruning is detrimental since it interferes with dormancy.

The condition of the trees on this parcel are quite common to what I see in my line of work. Wild fruit trees are typically volunteers emanating from an original planting. Near the homestead trees are planted and the seeds are dispersed in the landscape. Often these are farmed areas. Pasture trees, if they have escaped browse and reach bearing age are usually left in place for a food source for humans or animals, and as shade trees for livestock. Fencerows tend to retain healthier and productive trees as well. In other areas, encroaching forest slowly stresses the trees. The latter begin by growing leggy, chasing sunlight. Eventually, these sun loving species will become increasingly prone to disease, shade mortality in lower limbs, and eventually death. Trees in these thick areas can be small but actually quite old due to slow growth. In many cases apples can regain health with proper management.

One other aspect of apple tree improvement is reduction of competition. Termed “release”, crowding neighboring trees are slowly removed to allow for more sunlight infiltration and airflow. This will not only result in a healthier tree (greater photosynthesis), but also a gradual increase in fruit set and fruit quality. The best way to begin is to clock the period or direct sunlight the tree receives in the beginning and as competing trees are pruning or removed. In some cases removal is not necessary, but instead limbing up (cutting lower branches) or pruning the tops of trees is possible. The former can allow sun to move in horizontally particularly in early morning and later afternoon. Care of course should be exercised to reduce the chance of damaging the target specimen (the apple tree for instance) when working on tangent trees, etc.

Other competitors will also be present. Vines like grapes, hops, virgin's bower, bittersweet, etc. are common in abandon lots and orchards. It is recommended to sever these at ground level and allow to decay before pulling them out. Direct, careful removal in the canopy is best for the fruit tree but extremely laborious, especially in trees of great height. Also, other competition can be problematic, especially invasives like honeysuckle, barberry, burning bush, etc.

The surrounding area is best left devoid of any plant life of appreciable height, at least within a couple of yard of the trunk. This is to allow good airflow which reduces disease transmission. Lower growing species, especially herbaceous are normally fine in this area. All plants and organic matter should be removed from an area 1 foot from the trunk (dirt or stone only should remain). The latter is to keep the trunk healthy and dry. Further out, toward the canopy edge, taller plants may be allowed and are often beneficial to the ecology of the area.

Make sure all pruning debris is removed from the area. If this is impractical, reduce through chipping or cutting into smaller pieces and bury under soil or other debris (like hay, manure or other quickly rotting substances). This is important because old wood can transmit disease for years. We gather all of our prunings for use as home and farm heating fuel, woodworking, and meat smoking.

We will need to discuss apple tree management and land/planting planning at length this year, but this should give you some things to think about and to begin planning.