CRFG Monterey Bay Chapter

Soil Prep Ahead of Winter Planting

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Site Selection

- Sun light # hours, crucial for fruit trees, requirements differ species/variety
- Aspect slope, orientation, wind block, shade can all affect microclimate
- Drainage
  - Do an easy "percolation test"
  - Dig a 1 ft deep, 1 ft wide hole where you want to plant. Fill it with water. T=number of hours it takes to drain completely.
  - T<1h: too porous, likely soil too sandy. The solution is to increase organic matter (OM)
  - T>3h: too compacted, too heavy clay. The solution is also to increase OM.
  - 1<T<3: drainage is ok. But it never hurts to increase OM content.
- Soil test
  - helps to determine whether site is appropriate for tree(s) chosen.
  - know nutrient excess/deficiency, such as pH, salinity, conductivity, and how to improve any shortcomings.
  - We've used A&L Western Lab in Modesto. Their graphical analysis report is easier to understand. Report also makes recommendations on how to correct problems, based on what you tell them you want to grow. It costed $37 in 2016.

Soil Properties: synergistic

- Physical texture, structure
- Chemical nutrient carrying capacity, pH
- Biological community of microbes, great influence on nutrient availability, moisture, and plant health

Soil Prep

- What makes up soil?
  - Mineral ~45%
  - Air about 25%, fluctuates.
  - Water about 25%, fluctuates. Air & water is the pore space that takes roughly 50% of soil volume.
  - Organic matter only ~3-5%, but huge impact on soil productivity & plant health.
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- 3 Cs of soil prep
  - Cultivation
  - Compost

- Cover crop

- When
  - Ideally, way ahead of tree planting: months or even 1-2 years if soil is really bad
  - Fall, winter are ideal time to increase organic matter and boost microbial activity by cover cropping and/or mulching/sheet mulching. All these practices require water. Hopefully nature will provide that.

- Why
  - You only have one chance to best prepare the soil for your long-lived fruit trees
  - Planting into good soil will result in healthy plant, strong growth, leading to good fruit production in the future.

- How
  - For soil extremely devoid of organic matter or severely compacted, judicious digging or tilling, mixing in no more than 25% compost by volume may be the best way to quickly introduce organic matter, increase pore space (for air & water) and inoculate with microbes. Follow this with cover crop and/or mulching.

  - Cover cropping
    - Cover crop seeds best sown right before a heavy rain event in the fall. Otherwise requires water to get them started.
    - Sow recommended amount, or twice that if cost is not a problem.
    - 3-5" of mulch, chips/leave/straw over the seeds to help with moisture retention and provide food for microbes.
    - Water it in, or better yet, do this right before a significant rain event to let nature do the deep watering for you.
    - A few weeks before you want to plant your tree, mow the cover crop down with mower or by hand, leaving roots in the soil. Chop it up on the surface a bit. Throw 3-5" more of wood chips over it. Give it a good water. Keep the layers moist if rain is not in the forecast. Let it compost in place for a few weeks. Leave the roots in the soil to decompose.
    - Rake away the mulch. Dig a hole, assess the soil. Perhaps repeat percolation test.
    - Do not mix the wood chips into soil. Too much carbon directly in the soil can tie up nitrogen. But it's fine as mulch on perennials, and as it breaks down slowly, it'll feed the soil and feed the microbes.
    - If drainage hasn't improved enough, but your bareroot tree can't wait, see the "Multi-year hole" method below.

  - Mulching with horse manure and wood chips
    - This is the method used by Ken Konviser of Bob Cat Ridge Avocado Farm, who shared with the chapter when we visited his farm last month. This is how he prepares previously unplanted clay for spring planting: 4-6" of horse manure, rock dust & gypsum, topped by several more inches of wood chips. Let them sit until

spring. Then turn them in, raise them into a mound or berm for planting. I think rock dust & gypsum are optional. Rock dust can provide long term nutrients. Gypsum helps to loosen clay soil, prevent root rot for avocados.

- Sheet Mulching
  - Lots of info online. I won't go into it.
  - We'll be using this to take out a lawn at our new house.

Multi-Year Hole Method

- What if I haven't prepped the really compacted bad soil, but I already bought my bare root trees, and I NEED TO PLANT NOW!

- If you just can't wait, there is the "multi-year hole" method:
  - Dig a hole large enough to accommodate the tree's root for 1-2 years. Allow about 1' of root growth in all directions per year.
  - A square hole is better than a round hole. Also fracturing the bottom and sides of the hole helps to prevents roots from circling inside the hold of amended soil. Circling can lead to root girdling that can eventually kill a tree.
  - Plant the tree. Back fill with soil that is amended with up to 25% compost.
  - The compost provides pore space, and inoculates the hole with microbes to improve the soil in the hole.
  - Water the tree really well, immediately, to maximize root-soil contact.
  - As soon as you finish planting, start cover cropping/mulching from the edge of the hole outward, to the unamended soil. But do not disturb the root of your newly planted tree. The purpose of this is to improve the soil outside of your planting hole, so when the roots reaches the edge of the amended planting hole, it can easily grow into the new and improved native soil. This method will ensure the tree gets enough resources during its first couple of years.
  - This is a method of last resort, or for those who want their fruit NOW.

- Note: if your soil is already improved, you don't need to amend the soil in the planting hole.

What kind of cover crop should I plant?

- I'll share what's easier in the garden setting.
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- Summer:
  - Buckwheat
    - Produces a lot of organic matter, in the form of fine roots. Roots are not deep.
    - Short life cycle about 6-8 weeks. You can do several cycles during the warm seasons.

- As the blooms start to set seeds, broadcast the next cycle's seeds into the stand of plants.
- Pull the plants (12-18"), and lay them down over the sown seeds, as mulch. Most of the roots stay in the ground. They are really easy to pull.
- Again, water it in. Once it germinates, it can do ok with little water in clay soil. But some water produces more OM, and make a more attractive patch.
- If you want to provide habitat for beneficial insects, you can have two batches planted at different times, so one of them is always in bloom. But letting them go to seed will suck a lot of fertility out of the soil.
- The blooms attract many pollinators and beneficials that prey on insect pests.
- This is absolutely the easiest warm season cover crop to work with for me. They actually look quite pretty too.

❖ Fall/Winter:
  - Bell Beans or Fava Beans:
    - Fixes nitrogen.
    - Strong tap roots can reach deep.
    - Easiest to incorporate if taken down before or just in early bloom.
    - Cut at soil level, leaving roots in the soil.
    - Roughly chop with a spade or machete. Lay it on the soil.
    - Top with 3-5" of woodchips. Water it in well. Basically you have a layered compost right where it is needed.
    - Ready to plant in a few weeks. Rake away the mulch to plant, then replace the mulch. You don't want to mix the not-yet-composted chips into the soil.
    - If taken down early enough, there will be no recognizable plants after a few weeks.

  - Mustard
    - Birds don't like mustard seeds, so if you have a problem with bird eating the seeds you sow, use mustard.
    - Make sure you cut it down before it sets seeds. Some variety can be invasive if allowed to self seed, as seeds can stay viable in soil for multiple years.
    - Flowers will compete for pollinators with your fruit trees. Be sure to chop it down before your trees flower.

❖ There are other mixes that may produce more biomass in a farm setting, such as BVOP mix (bell beans, vetch, oats, pea), but harder to work with on a home scale with only hand tools.

❖ Perennial Cover Crop
  - Red Clover
  - Not so much for soil prep ahead of planting, as it was really slow to get established. But as long as I'm discussing cover crop, I'll just mention my experiments with clover.
    - I have it growing perennialy around some of my fruit trees.

- It doesn't produce as much OM or fix as much N as bell beans, or even its annual cousin Crimson Clover. But it's much less work and suits a lazy gardener. The nature of perennial is that they grow slow and steady.
- Once established, I hand cut it to about 4-5" with a seckle, whenever it gets too tall or too unruly. I use the cutting (into 6-8" segments) as mulch, or tuck it under the wood chips to cycle the nutrients and OM. The jostling and cutting emulates grazing, and causes some of the nodules to break off the roots, therefore, releasing its nitrogen content.
- It does need to be inoculated initially. I have not been able to find pre-inoculated red clover seeds.
- I got my plants established by beginner's luck. Since I couldn't find red clover seed pre-innoculated, but could find crimson clover inoculated, I mix the two seeds together to save myself inoculating, since they share the same rhizobium species. The first year, Crimson Clover grew and bloomed like crazy (the nature of annuals). I'd cut the plants short when it looked too scraggly. I thought the red clover had simply failed to grow. By the second year, the crimson clover slowly disappeared, and I started seeing the pink bloom of red clover. I think what happened was the crimson clover essentially served as a nurse crop for red clover during the first year. Then annual crimson clover died, did not reseed. Slowly the red clover plants got bigger and stronger. Now it's all I have out there.
- I've tried other perennial clover, like Palestine Strawberry Clover. I found it too invasive because it spreads by runners. The red clover is much better behaved in the garden setting. Perhaps the wood chips prevent it from reseeding. When I want red clover in another area of the garden, I simply dig up part of a clump and transplant it.

Useful Links

Much of the material I presented here today were learned from and used at UCSC Farm and Alan Chadwick Garden. I have been experimenting with them in the home garden setting for the last several years.

You can find a much more detailed video on preparing for winter planting in this video from UCSC Center for Agroecology: Getting Started with Fruit Trees 2022

You can also find additional educational videos on many other aspects of organic farming here at UCSC Center for Agroecology website. There is a whole section on fruit trees. https://agroecology.ucsc.edu/resources/instructional-videos.html