

# Practical Orchard Health

*with*

Michael Phillips

*author of “The Holistic Orchard”  
and “The Apple Grower”*

*from*

*Lost Nation Orchard, New Hampshire*



Understanding the underlying principles for growing healthy fruit becomes clear when walking through an orchard with Michael Phillips at the height of the growing season. Major insect challenges can be resolved safely and organically when you perceive who, what and when. Dealing with disease from a holistic perspective requires an in-depth understanding of nutritional cause-and-effect. Biodiversity brings in untold connections. The challenges you face at your locale will become far more manageable as you build a holistic system that keeps trees and berry plantings healthy from the get-go.

## **The Orchard Year**

The orchard calendar defined by bud stages

Determining site priorities that fit your life+

Building system health allows subtler methods to work

## **Holistic Fungi**

More than disease+going on here

Ramial wood chips

Fungicide misuse adds to susceptibility

Core holistic spray recipe

## **Early Spring**

Biological replacement for dormant oil

Bt at pink for the bud eaters

Enjoy life while the orchard looks good!

## **The Petal Fall Triad**

Sawfly, curculio, & codling moth

Points of vulnerability

Righteous kaolin clay coverage  
Trap tree understory management

### **Thinning the Crop**

Far more important than you may think!

### **Moths and more Moths**

Species mix compounds each situation  
Rotate approach to fit moth pressure  
Pure neem oil's azadirachtin component inhibits molting

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### **Blight and Canker**

Bacterial disease must be reckoned  
Bark conditions and tree paste

### **Summer Disease**

Rots and cuticle-feeding fungi  
Fermented herbal teas

### **Borer Hell**

Beetles versus moths  
Botanical trunk spray  
Spade bit diligence

### **Apple Maggot Fly**

AMF trap nuance  
Timely drop control makes for a clean orchard

### **Soil Investment**

Fertility ratios tied to overall health  
Biologically-oriented labs

### **Critter Onslaught**

Deer strategies  
Vole guards  
Bird antics

### **Stirring the Biological Stew**

Leaf decomposition: lime, compost, mowing  
Fall holistic spray variations  
Bark crevice colonization

# Ramial Wood Chip Primer

There are white rots and there are brown rots related to decomposition. The first support a deciduous environment; the latter deal with high tannin content and thereby define the evergreen forest. Let's talk about ramial wood chips as the main course for feeding mycorrhizal and saprophytic fungi in an orchard food web that in turn supports our trees.

## Defining Ramial Wood

- Consists of twig wood less than 7 centimeters in diameter- being not much more than 2½ inches around at the large end of the branch
- Species for chipping should mostly be deciduous, as here lays the soluble lignin advantage use by white rots to produce humic and fulvic acids
- Coarse pieces are preferable, including the prunings from fruit trees.

## Understanding Ramial Nuance

The proportion of essential twig nutrients in wood chips increases as average branch diameter decreases. Nitrogen, phosphorus, potassium, calcium, and magnesium are found in the green cambium where leaf photosynthesis production and root nutrition come together to make a tree . . . which we in turn can redirect to build ideal soil in our own orchards to make fruit trees.

Size of the branches being chipped matters yet again when we consider the immediate impact on soil life. The carbon-to-nitrogen ratios in ramial-diameter wood averages 30:1, going no higher than 170:1 as we consider the larger end of the recommended branch. These ratios rise dramatically in stem wood, running 400:1 to as much as 750:1, thereby creating that soil dynamic where nitrogen becomes unavailable to the plant until such %og mulch+has significantly been broken down.

Soil fungi are adept at creating humus from a lignin source. Soil that has been built from the top down through fungal action undergoes humic stabilization- such soil has staying power and maximized nutrient recycling. Fruit trees belong in such soil. Ongoing soil health results from soil structure being managed by soil organisms. Fungal hyphae physically bind soil particles together, creating stable aggregates that help increase water infiltration and the soil's water-holding capacity. This accumulation of acid-rich organic matter as humus results from the decomposition of ramial wood chips.

Decomposing fungi can be classified into two subgroups. The *white rots* use enzymatic chemistry on lignin-rich hardwood to produce fulvic and humic. The *brown rots* transform softwood cellulose to produce polyphenols and allopathic compounds specifically relied upon by evergreen species to suppress deciduous species.

## Practical Applications of Ramial Wood Chips

- A mixed chipping containing no more than 20 percent softwood will favor white rots and thus can be spread freshly chipped.
- Steer away from solely softwood wood chips for orchard purpose. That said, aging a homogenous pile for a year overturns the allopathic impact of brown rots. Mix with mature compost to create rich woodsy mulch for berry plantings.
- Diversity is always good. Dump ramial wood chips thickly in piles on different sides of bearing trees over the years. Young trees can be ring mulched.
- Leaves in full green make for higher nitrogen content. %Summer chips+heat up beyond the desired fungal influence. This is fine for the initial phase of composting but not something to apply directly as orchard mulch.

## THE FOUR HOLISTIC SPRAYS OF SPRING

*Let's have that discussion about timing and rates for a holistic approach to disease. The bud stages given here are for apple but can be bounced a week or so ahead for stone fruit where bacterial disease may be a concern. Apple timing is absolutely correlated to the primary infection period of most fungal diseases and appropriate for berries as well.*

**Week of Quarter-Inch Green.** The soil is a *sleepy place* coming out of the dormant season, even after sap flow has begun in the tree. This first application of neem oil, fish, and microbes works in part as a catalyst spray to get both soil and arboreal food webs engaged. Buds are showing solid green tissue, somewhere between green tip and half-inch green. Pick a warmer day than not within this time frame to thoroughly wet down the branch structure and trunk and ground surface within the dripline of each tree. Target any fallen apple and pear leaf piles from the previous fall to facilitate scab decomposition. The neem rate can be doubled if desired for this one application only (to a 1% concentration by volume) as exposed foliage is minimal.

**Early Pink.** Leaf tissue has filled out considerably at the base of blossoms, with that first smile of pink revealing itself in the apple flower. We're still in catalyst mode as regards the trunk and ground but also tuned into the competitive benefits of arboreal microbe communities on the leaf and flower cluster surfaces. Don't wait too long for this as neem oil and effective microbes should never be applied directly on open blossoms.

**Petal Fall.** Spraying to the *point of runoff* is now the name of the game, with lots of leaf and fledgling fruitlets to cover thoroughly. This is an important renewal spray as the bloom period may have been extended by cool weather. You will need to average what marks %orchard-wide petal fall+between early varieties that finish blooming well before later varieties. Weather plays a big role in this interpretation as rain *tickles the fancy* of pathogenic fungi especially at this moment in the season.

**First Cover.** Ditto. But wait. . . many of you may not realize what an orchardist means by the term *cover spray*. This marks one week following the petal fall application. Spray strategies for certain pests (particularly the use of refined kaolin clay for curculio) overlap at this time and can affect timing here.

**Home Orchard Rates.** This assumes a four gallon backpack sprayer is used to cover so many trees to the point of runoff. Mix 2.5 ounces of pure neem oil with a generous teaspoonful of soap emulsifier to achieve a 0.5% neem concentration. Use 10 ounces of liquid fish and 6 ounces of EM *mother culture* for this backpack volume. Add a dollop of blackstrap molasses to launch those dormant microbes. Backpack applications also should include 0.5 ounce (dry weight) of the seaweed extract.

**Community Orchard Rates.** This assumes a hundred gallon spray tank capacity to cover one acre of trees. A half-gallon of pure neem oil mixed with a quarter cup of soap emulsifier mixed into 100 gallons of water achieves a 0.5% neem concentration. Seaweed extract is a given: 8 ounces (dry weight) goes in the tank. Two gallons of liquid fish and 1 2 gallon of *activated* effective microbes completes the brew.

# Holistic Compendium

## A Seasonal Checklist for the Healthy Orchard

This task compendium doesn't tell you so much what to do in your orchard as provide an example. Writing down your orchard's schedule will deepen your understanding both of what needs to be done and what can be improved. The timing of avant-garde holistic techniques is included here to guide you in the healthiest way I know to grow tree fruit. Tweaking this systems approach means taking responsibility to match the challenges you face at your locale.

### Dormant Season

- Check for deer incursions at least weekly; snowshoe around the base of tree trunks to pack down vole tunnels.
- Order rootstock; collect scions for grafting.
- Prune all bearing trees. You need to establish an open framework of scaffold branches that allows maximum penetration of sunlight and drying breezes.
- Remove all mummified fruit (still on the trees) to reduce rot spore inoculum.
- Complete routine maintenance on all orchard equipment.
- Order organic orchard supplies for the coming season. Be sure to include seaweed extract to add to every spray tank throughout the growing season.

### Bud-break

- Chip prunings in orchard for the benefit of soil fungi. Any obviously-cankered wood (and thus a source of disease inoculum) should be removed from the site.
- Finish any compost spreading not completed in late fall. Spread deciduous wood chip mulch in haphazard fashion.
- Prune out old canes in berry plantings; fortify the soil bed annually with an organic fertilizer blend or compost; spread deciduous wood chips or leaves (bagged back in the fall) as bed mulch.
- Plant new trees as early as possible.
- Boron needs are met with a sprinkle of Borax every few years. Most other micronutrient shortcomings can be corrected by good compost habits and using seaweed in tank mixes when spraying.
- Remove any spiral trunk guards used on young trees.

### Week of Quarter-inch Green

- 1<sup>st</sup> holistic spring spray (liquid fish, pure neem oil, effective microbes) at double rate aimed at ground, trunk, and branch structure. This is a catalyst spray to wake up beneficial fungi, establish arboreal colonization in bark crevices, and interrupt the development of foliage pests now in the egg stage. Stone fruit growers can initiate the holistic sprays as much as two weeks earlier than apple timing.
- Apply an organic fertilizer blend to non-bearing trees in order to grow a strong framework of branches quickly.
- Train branch crotch angles on young trees with limb spreaders.
- Cultivate around non-bearing trees and replace shade mulch if available.
- Check all trunks for borer damage missed in fall inspection.

## **Pink**

- 2<sup>nd</sup> holistic spring spray (liquid fish, pure neem oil, effective microbes) aimed at unfurling buds, trunk, and branch structure. A good amount of run-off should reach the ground as well. Direct a blast at any obvious leaf piles as not yet decomposed from the year before.
- Spray fruit trees with *Bt* (add to holistic tank mix) if unfurling leaves reveal a significant presence of bud moth larvae.
- Hang white sticky traps for European apple sawfly.
- Primary scab season has begun. Relax. The holistic applications have the trees primed to deal with early ascospore release.

## **Bloom**

- Cut down wild fruit trees spotted in bloom within a hundred yards of orchard to prevent pest migration to your trees. The exceptions here are those trap trees managed (i.e., pruned at this time) as an alternative home for insects put off by repellent strategies.
- Become a honeybee steward and give three cheers for the wild pollinators.
- Hang pheromone wing traps for monitoring moth presence (pheromones are species specific) and timing of first generation egg hatch.
- Lightly cultivate edges of dwarf tree rows in preparation for a summer cover crop.

## **Petal Fall**

- 3<sup>rd</sup> holistic spring spray (liquid fish, pure neem oil, effective microbes) aimed at leaf canopy and developing fruitlets. Make this application early if king blossom pollination was good as oils may assist in smothering excess flowers. Including a light rate of Surround® in this mix will help establish a clay matrix for bonding additional kaolin clay layers.
- Initiate full coverage of the refined kaolin clay. Two or three applications are necessary from the get go to build up barrier protection from the imminent curculio invasion and to be helpful in suppressing moth oviposition (laying eggs). Repeat every 5 to 7 days for next 2 to 3 weeks, taking into account the wash off factor due to a heavy rain.
- Gather EAS sticky traps. If damage to fruitlets seems apparent and widespread, include spinosad in the first full-rate clay spray to check further EAS damage to additional fruitlets.
- Primary scab season is in full force now. Some growers may deem a micronized sulfur application on disease-prone varieties necessary if spore maturity has built up and definite rain is predicted. Sulfur can be tank mixed with subsequent Surround® sprays. Take note: Mineral fungicides will compromise arboreal colonization.
- Prune out shoots and break off blossom spurs if fire blight strikes become apparent. Good arboreal colonization is the best offense against fire blight.
- Begin mowing of green understory (preferably with a sickle bar and/or scythe) and pile resulting mulch thickly under trees around the dripline.

## **First Cover**

- 4<sup>th</sup> holistic spring spray (liquid fish, pure neem oil, effective microbes) aimed at leaf canopy and developing fruitlets. The fish will help meristem development for return bloom, neem stimulates immune function and hinders moths, microbes are biological

reinforcement for the summer ahead. Add horsetail and nettle teas as well to this brew.

- Full clay coverage continues on bearing trees for growers faced with curculio.
- Place drop clothes under trap trees to contain infested June drops+thus preventing larvae from getting to soil to pupate. Alternatively, give those chickens a particularly rousing pep talk.
- Hand thin crop, beginning with heaviest-setting varieties. Leave one fruit per cluster, being even more aggressive on varieties that tend to bear biennially otherwise. Timely thinning must be completed within 40 days of petal fall. Place infested fruitlets in buckets for disposal via the chicken coop or as road splatter.
- Primary scab season usually ends with a daytime rain around this time. A second micronized sulfur application may be deemed necessary on susceptible varieties, especially if more than a week has passed since the previous rain.
- Spray for first generation codling moth according to degree day tracking if egg laying suppression from the clay has been gauged insufficient the previous season. Options include *Bt*, spinosad, and granulosis virus; any of which can be tank mixed with fish oil as a UV inhibitor and molasses as a feeding attractant. Growers may rely on parasite control and cardboard banding if high moth pressure has been abated previously.
- Pinch off shoots on young trees to correct crow foot situations from heading cuts.
- Continue biological mowing+with a scythe or sickle bar mower.
- Hang bird netting in place over cherries and blueberries.

### **Those Lazy, Crazy, Hazy Days of Summer**

- Hang out sticky traps for apple maggot fly by mid-June. Target early varieties and/or the orchard perimeter. Renew tangletrap coating every 4 to 6 weeks if using a sticky variation of this strategy. Traps should be moved to mid-season varieties in late July.
- Apply thick kaolin slurry by brush for borer protection in late June and late July. Alternatively, botanical trunk sprays (at a 1% neem oil concentration) can be directed to saturate lower bark tissues and the soil at the immediate base of each tree.
- Summer prune watersprouts on especially vigorous apple trees in late July/ early August to improve fruit color.
- Spray for summer moth control according to the timing of the species attacking your fruit. A rotation of spinosad and *Bt* just as eggs hatch is typical. Pure neem oil may well get this job done in its own right if holistic spray options for disease are being continued in the summer months.
- Holistic summer sprays include pure neem oil and nettle tea. Horsetail tea should be included the first two rounds as well to build up the silica defense against summer diseases. These are ideally applied every 10. 14 days up till harvest. In addition, bicarbonates may help with sooty blotch and flyspeck on light-colored apples where humidity tends to be especially high.
- Spray foliar calcium (at biweekly intervals) beginning when the fruit reaches the size of a nickel if bitter pit has been a problem on certain varieties. Fermented comfrey tea is a homegrown source for bioavailable calcium and can be included in the holistic summer sprays.
- Mow pathways for better harvest access and enjoying your orchard. A light scything under heavily-laden trees will help in keeping early drops picked up.
- Visit your trunks: handweed that peastone circle, check for borer, adjust mesh vole guards, rub loose bark off, place a repellent mudpack over active sapsucker holes.
- Sow an oat (or legume mix) cover crop along the edges of dwarf tree rows.

- Take ongoing soil tests every few years to check on nutrient status and thus the need to obtain specific soil amendments for fall application.
- Place intact bales of mulch hay around orchard environs. The goal here is nesting sites for field mice (which are not voles) so that abandoned nests the next spring become bumble bee habitat.

### Harvest

- Prune stone fruit post-harvest in dry zones to lessen winter establishment of bacterial canker.
- Check for borer egg slits at soil line of trunk and smush these in along the edges with the tip of hand pruners.
- Gather AMF traps and clean; remove all other monitoring traps.
- Gather all drops biweekly to feed to the cow or other livestock. A hot compost pile (turned often, for garden use) will work to destroy larvae in infested fruitlets whereas a *laissez faire* pile will not.
- Applying soil amendments at this time works best as the soil remains relatively warm and feeder roots are in uptake mode.
- Oh yeah . . . pick an amazingly high percentage of beautiful fruit!

### Winter Preparation

- Spread lime (if light applications of %renewal lime+were indicated earlier on a soil test) on fallen leaves, mow aggressively, then spread well-aged compost.
- A holistic fall spray (liquid fish, pure neem oil, effective microbes and/or compost tea) made when 50% of the leaves have fallen off the tree is absolutely recommended. Target the ground, trunk, and branch structure. This is important for leaf decomposition as well as competitive colonization from bacterial and fungal disease within bark crevices. The nitrogen in fish should also help alternative bearing trees shore up bark nitrogen reserves for spring bud growth.
- Remove limb spreaders.
- Install tree guards on young trees and fork thick %ing mulch+further back to deter nearby nesting. Check that mesh protection from voles remains in place on all bearing trees with tender bark. Speak kindly to resident foxes and coyotes if vole numbers seem especially high.
- Renew whitewash on smooth trunks to prevent snowline freeze injury. Growers using %borer slurry+in midsummer may find enough whitening still in place.
- Hang peanut butter strips on electric fence for baiting %ineducated+deer tongues.
- Give thanks for another blessed year on this good earth.

*If a grower knows why, he or she will teach themselves how.*

*Liberty Hyde Bailey*