UNIVERSITY OF CALIFORNIA
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Practices to Improve Overgrown Apple Orchard Health

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Proactive Management

Sustainable orchard management practices are critical to promote apple tree health, resilience to stress, and fruit production. What should you do if you find yourself managing an apple orchard that has not been well cared for in the past? This factsheet outlines practical steps to help improve apple orchard health.

First and foremost, be proactive! Not doing anything to manage your orchard is equivalent to bad management. “Letting nature do its thing” without getting involved at all is neglect. Over centuries, people have selectively bred apple cultivars for desirable agronomic traits such as flavor, color, crispness, etc. Apple trees flourish under our care when sustainable management practices are implemented. You might be encouraged to see how even a little strategic management can lead to noticeable improvements in tree health.

If your trees are not thoughtfully managed, they will be unhealthy, weak, stunted, and more susceptible to pests. They will not be able to compete with weeds and vegetation for essential nutrients and water. It will cost you time, money and heartache. Apple trees depend on us and our attentive care.

Pruning to Reduce Tree Size

The UC ANR handbook, “The Home Orchard” Publication 3485, suggests using one of these 3 pruning methods if you are working with overgrown trees:

Option #1: Maintain tree height and focus on using thinning cuts. This method is a good option if the tree is structurally sound and at a manageable height. Start by pruning out broken, dead and diseased branches. Remove branches that grow towards the center of the tree, and branches that cross or rub against each other. Then thin the rest of the canopy out to encourage sunlight infiltration. However, maintain enough canopy coverage to provide shade on main branches to help prevent sunburn. Generally, aim to remove no more than approximately a third of the canopy at a time.

Option #2: Reduce tree height slowly over a three-year period. If the tree is structurally sound but taller than is manageable, consider this option. Decide on your preferred tree height for permanent structural branches. Then reduce the excess height by a third each year for three years in the winter until you reach the desired height. This incremental pruning approach helps limit the stress of large pruning cuts on the tree.

Option #3: Drastically cut back all main branches except for one or two temporary scaffold branches. This is a more extreme method to reduce tree height by removing large branches in the early spring. Wait until this time to cut large branches so that the wounds heal faster, and the risk of decay is relatively lower than in the winter. Avoid leaving stubs. Apple trees are capable of resprouting from large lower branches. However, it is important to consider that if calluses are not formed, large cuts may rot. Be sure to leave lateral branches to form the

framework for smaller tree architecture. You can continue reshaping over time.

Trees that are not pruned enough develop dense canopies with poor light interception. They have low flower bud formation, poor fruit set and low fruit quality. Large, unpruned trees are difficult to harvest and manage throughout the year.

General Pruning Tips

In general, it is important to prune your apple trees annually to promote good tree health. Pruning encourages the growth of new fruiting wood which then supports high quality fruit. It promotes structural integrity and functional tree architecture (the spatial layout of the branches and canopy) for easy management. Prune each winter while trees are fully dormant. You can prune in the summer too, as needed. Use pruning to keep your trees at a manageable height so that you can easily harvest and maintain good cultural practices. Be sure to remove water sprouts and suckers.

Be strategic with your pruning cuts. Aim to improve tree architecture and remove diseased branches. Make sure you have the appropriate tools including shears, loppers, a handsaw, and sanitizer for tools to reduce the risk of spreading diseases. Keep them well sharpened. Sanitize your pruning equipment on a regular basis by spraying a solution of 70% isopropyl alcohol and 30% water with a spray bottle. This reduces the risk of spreading pathogens as you prune. Many pathogens enter tree tissue through pruning cuts, so this step is important to prevent disease spread.

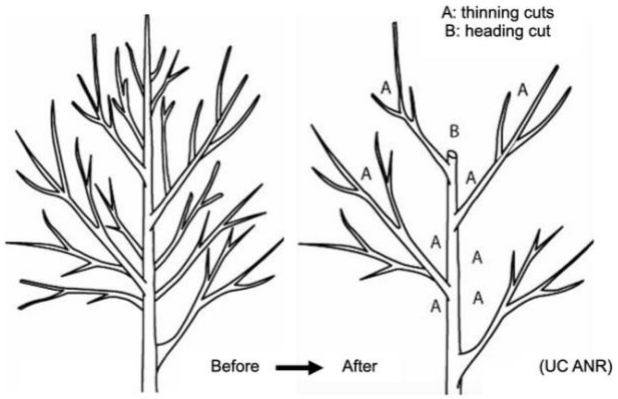

Diagram 1. Thinning cuts (A) remove shoots to improve light interception, maintain vigor, and minimize excess fruiting. A heading cut (B) removes the terminal part of a shoot. This encourages lateral growth, reduces overall tree height and keeps tree size manageable.

Before you start pruning, create a plan based on your goals for tree architecture and disease removal. Prune thoughtfully to ensure you still provide appropriate shading to help reduce the risk of sunburn on branches and fruit. Applying whitewash to trunks and main scaffold branches can provide protection from sunburn as well. Whitewash can be made from a mixture of 50-50 white interior latex paint and water. In addition, thinning out fruit can help promote good fruit size while reducing physical strain on the tree as well as water and nutrient demands. For more information about pruning, see this video.

Weeds, Soil & Nutrients

Neglected orchards are often overgrown with weeds which compete with trees for nutrients and water. Many apple orchard managers use mowing, weed-eaters, and tillage to keep weeds under control. However, in many situations repeated overuse of tillage can degrade soil health over time. The degree of damage often depends on factors like tillage frequency, depth, soil type, and water content when tilling. Strategic or minimal tillage use is important for soil conservation. Cover crops

can help out-compete weeds to varying degrees depending on the orchard, weed species present, and cover crop selection. Weed species identification is important to guide management decisions. Some weeds are noxious, while others cause fewer issues. If not a noxious species, weeds can function as cover crops in the right circumstances. Different types of weeds may require different management approaches. Various herbicide products are available for weed control including organic options. Speak to a licensed Pest Control Advisor for more information on chemical weed control options.

Consider implementing soil health management practices however works best for your operation. Soil health is the capacity of the soil to function as a living system that supports life. Healthy orchard soil supports nutrient cycling, stores carbon, improves water dynamics, and promotes soil biology. You can improve soil health by using cover crops, organic matter amendments such as compost and mulch, and using tillage strategically only when necessary. Soil testing before you plant your orchard and every couple of years afterwards allows you to assess soil fertility, guide amendment applications, and correct issues such as low pH, organic matter, and nutrient levels.

All plants need certain essential macro and micro nutrients to function, be healthy and produce good yield. Nutrient deficiencies can weaken apple trees and make them less resilient to stress. Some nutrient deficiencies cause visible symptoms. For instance, nitrogen deficiency typically leads to uniformly pale green or yellow leaves. Calcium deficiency can cause bitter pit, an abiotic disorder in fruit that leads to small, sunken, corky brown spots with a gritty texture and bitter taste.

Neglected apple orchards likely have nutrient deficiencies that should be corrected to support good tree health, stress resilience, and yield quantity and quality. Ensure your trees are getting enough nutrients to be healthy but avoid over-fertilization. Excess nitrogen can lead to too much shoot growth and potentially contaminate nearby waterways through leaching or runoff beyond the orchard. In many apple orchards, cover crops and compost are sufficient to supply most of the orchard's nutrient needs. However, supplementation with fertilizers may be needed. There are many organic fertilizer options on the market. Read the label of fertilizer products carefully and apply the appropriate rate. Consider leaf tissue analysis to directly assess the nutrient status of your tree. Ensure your apple trees have sufficient nitrogen, potassium, calcium and zinc as these nutrients tend to be the most common deficiencies in apple orchards.

For more information, see this video, this website, this tissue sampling guide, and this list of labs.

Irrigation & Dry Farming

In the North Bay Area, most apple orchards are dry farmed while a small number are irrigated. Some orchards have irrigation infrastructure that is only used as needed in the early summer or during droughts. Dry farming is a management approach that relies on rainwater stored in the soil profile for tree use in the spring and summer. While apple trees can withstand some amount of drought stress, sufficient water supply is critical for tree function. The amount of water your trees need depends on tree size, age, rootstock, scion, spacing, soil texture, site location, microclimate, production goals, and other environmental and cultural factors. Consider all these factors as you design dry farming and irrigation management strategies for your orchard.

Visual signs of water stress in apple trees include upward leaf curling or cupping, wilting, dead leaf tissue that turns tan or brown at the leaf edges, bark cracking, and stunted growth. Severe water stress can permanently damage, defoliate and kill trees. In addition to scouting for visual signs of tree water stress, a variety of technologies are available to support water management decisions. Orchard managers may consider using a pressure chamber to directly quantify tree water stress and help guide irrigation decisions. Additionally, soil moisture sensors can provide valuable information about how much water is available to trees at a given time. Generally, when apple fruit is around half-size, irrigation can help increase fruit size. Later in fruit development, moderate water stress can improve fruit quality.

If your apple orchard is irrigated, focus on efficiently concentrating water in the root zone where tree roots can access it when needed. Drip irrigation is more efficient at delivering water directly to the root zone than micro sprinklers. Some growers prefer frequent shallow irrigation, while others use less frequent deep soaks. As you think through irrigation frequency and duration, consider your soil texture and monitor tree responses. Water will move through sandy soil faster than heavy clay soil. Generally, irrigating a bit more than normal prior to and during heat waves can help reduce severe heat stress and associated tree damage. Ensuring sufficient irrigation can help reduce the risk of sunburn on fruit and branches by supporting tree health, canopy coverage, and cooling.

Most apple orchards in our region were planted many decades ago and have never been irrigated. If you are planting a new apple orchard and you are interested in dry farming, consider inherent site characteristics such as microclimate, precipitation, and soil texture. Some sites will be better suited for dry farming than others. During orchard design, explore deep-rooted or drought tolerant rootstocks and scions, and cultivars that mature early. Consider wide tree spacing to reduce competition for water between trees.

When managing dry farmed orchards, consider how to adequately fertilize your trees via amendments, cover crops, and/or fertilizers while maximizing soil moisture retention. Building soil health can improve nutrient reserves, soil structure, and soil organic matter levels. This in turn enhances water infiltration and retention. Some growers use dust mulching by tilling the soil surface to break soil aggregates and seal in moisture. Growers report that this helps retain water deeper in the soil. However, bear in mind that repeated tillage can increase the risk of erosion over time and reduce soil organic matter. Dust mulching may be more suitable for some situations than others.

Growers report several benefits of dry farming apples including overall water savings, improved weed control, higher yield quality, and marketing potential. However, it is important to bear in mind that dry farming typically leads to lower yield weight. Also, consider how dry farming management strategies may change during dry, moderate, and wet water years. In the North Bay Area, some winters may experience very low rain. Low precipitation may cause severe tree water stress the following growing season in dry farmed orchards unless irrigation is in place as a “safety net.” Growers can consider setting up irrigation and using it as needed. Dry farming is not a one-size-fits-all, “all-or-nothing” approach. Most dry farmers deep irrigate their trees at planting for several years to ensure good root establishment. There is no official certification for dry farmed orchards like there is for certified organic farms. It may be more useful to think about dry farming as a set of practices that can reduce water use and orchard costs, rather than a strict set of rules.

Consider your options for ensuring your overgrown apple orchard has its water needs met. Water access and the ability to irrigate as needed helps reduce the risk of severe tree drought stress. Whether you are dry farming or irrigating regularly, use an appropriate combination of water and soil management strategies and decision support tools to improve water dynamics and supply for your trees. For more information about orchard water and nutrient management, see this video, this presentation, these resources, and this presentation.

Integrated Pest Management

A pest is any unwanted organism that damages or interferes with plants. Integrated Pest Management (IPM) combines multiple strategies to keep pest damage low and reduce the use of synthetic chemical controls. IPM is a big-picture, ecosystem-oriented "toolbox" approach. You can select the tools and strategies that make sense for your unique situation. If you use pesticides, always follow the specific instructions on the product label. You can find more information about apple orchard pests and IPM strategies on the apple section of the UC IPM website. Key pests are highlighted in the following paragraphs.

Codling moth is the top insect pest causing economic damage in apple orchards in our region. Adult codling moths have mottled gray and brown, tentlike wings with dark brown coppery markings on wingtips (see photos here). Larvae burrow into fruit and leave frass. Make sure you are familiar with this insect pest and appropriate IPM strategy options. These include monitoring, mating disruption, sanitation, thinning infested fruit, and organic products such as kaolin clay, Spinosad-based products, etc. For more information about codling moth, see the UC IPM website for codling moth in apple orchards and this webinar recording.

A suite of wood-colonizing fungal pathogens cause branch cankers in our region. Common symptoms are brown lesions on branches and branch dieback. Wood tissue underneath lesions appears reddish-brown to dark brown with sunken, elliptical lesions (see photos here). IPM strategies for this issue include regular scouting, pruning out diseased branches, regularly sanitizing pruning tools, using registered pruning wound protectants (but not sealants), promptly removing debris from the orchard, and copper-based fungicides. For more information about branch canker diseases, see this blog post, the UC IPM website for European canker in apple orchards, and this webinar recording.

Fire blight is a bacterial disease that causes blackened blossoms and fruit, twig and canopy dieback, and dead areas on branches and trunks (see photos here). Cankers release watery ooze that turns dark and leaves streaks on bark. Infected shoot tips form a wilted "shepherd's hook" shape. IPM options include choosing tolerant varieties at planting and designing your orchard to promote good air flow. After planting, scout regularly, remove alternate hosts, prune out infected tissue, sanitize pruners when pruning in the spring, remove all infected tissue from orchard, and copper-based products. For more information about fire blight, see this blog post, the UC IPM website for fire blight in apple orchards, and this webinar recording.

Pocket gophers are small burrowing rodents that eat plant roots and can cause crop damage. The best indicator of gopher presence is crescent-shaped mounds of fresh soil that they push to the surface as they tunnel. IPM strategies include monitoring, encouraging natural predators, avoiding cover crops with large taproots, deep tillage to destroy burrow systems, and developing an

effective trapping program. For more information about gophers, see this blog post, the UC IPM website for pocket gophers, this UCCE trapping video, and this webinar recording.

In general, it can be helpful to take a neighborhood approach to Integrated Pest Management since pests are not confined by property lines. Talk to your neighbors about the pests you are managing in your apple orchard and what strategies have worked for you so far. Take a friendly, collaborative approach. Emphasize that working together to manage these pests will benefit everyone in your neighborhood and help support your local apple producers.

Conclusion

In conclusion, make observations, consider what your trees need, and be proactive! Make sure you are pruning strategically, fertilizing and irrigating enough, and actively managing key pests like codling moth, diseases and rodents. Keeping good records will help you notice trends over time and improve the health and efficiency of your apple orchard. Even within a year or two, you may start to notice encouraging signs of improved tree health and resilience.

Recommended Resource

Ingels, C.; Geisel, P.; Norton, M. (2019) The Home Orchard. University of California Agriculture and Natural Resources. Publication 3485.

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