



Managing Compacted Soils in Vineyards

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Vineyard soils are quickly compacted by equipment repeatedly passing up and down row middles. The degree of compaction varies with soil type and amount of traffic. Sandy soils are more easily compacted than fine textured soils, wet soils are more easily compacted than dry soils, and freshly cultivated soils are more easily compacted than firm soil.

Soil compaction not only reduces total pore volume but reduces the average size of soil pores. This impacts water and air movement in the soil, and increases soil density making it more difficult for roots to develop. Growers who french plow vine rows in the spring and then irrigate down the french plow furrow are always amazed how quickly the water infiltrates. Unlike vine middles, the soil under the vine row has never been compacted, and the infiltration difference is a dramatic illustration of the impact of compaction on water infiltration.

Soil compaction occurs under wheel traffic to a depth of 18 to 24 inches; therefore, to loosen the soil a chisel or ripper shank should be pulled to the depth of compaction. The most effective time to rip is in the fall, after harvest, when the soil is dry. Ripping through moist soil does little to relieve compaction and could make matters worse, so if the soil isn't dry to 24 inches, don't bother.

Ripping two feet deep results in considerable root pruning. Some feel that root pruning is good and stimulates root growth in the spring, but this has not been experimentally verified. Actually, the value of ripping vineyards in the fall to loosen compacted soil is open for debate.

Those who question the practice feel that compaction will reoccur quickly, and that seasonal root activity is not improved in the compacted area beneath wheel traffic. A few passes with the tractor and the soil is recompacted. Much more research is needed under a variety of conditions and soil types to settle the debate. Managing the vineyard floor to minimize compaction is good advice and not open for debate.

Don't run equipment over wet or freshly disced ground. Furrow placement can also be critical, particularly on soils with slow infiltrating characteristics. Locate furrows away from wheel traffic so that the bottom of the furrow is not compacted during the season. Keep equipment wheels up on the bed rather than down in the bottom of the furrow. Till only as necessary and only when soil moisture content is relatively low. Reducing the amount of cultivation will help minimize compaction; noncultivation floor management systems can be quite effective. Also, grass cover or the use of cover crops can improve soil structure and aggregate stability which helps minimize compaction.

Winter cereals such as rye, barley, or oats are good cover crop choices for improving soil structure and reducing soil compaction. They produce the greatest quantity of organic matter and their fibrous root system is more likely to grow into compacted soil. Of the cereals, rye grows the best during the colder winter months, and is not troubled as much by diseases. The most important single factor in determining the success or failure of a winter cereal cover crop is the time of planting. Early planting (October - November) permits maximum stand and growth of the cover crop.

Winter cereals (rye, barley, and oats) will usually respond to nitrogen so the fertilization of the cover crop should be integrated with the nitrogen fertilization program of the vineyard. This can be accomplished by dividing the annual use of commercial fertilizer and supplying one-half to the cover crop in the fall

and the other half in late April or postharvest. When the cover crop is disced under in the spring and decomposes, the nitrogen trapped in the cover crop will be mineralized and released to the vines during the growing season.

Cover crops should be worked in the soil by mid-March in preparation for frost protection. The soil should be firm, bare and moist during the frost danger period.

Compacted soils result when man and machinery break down the natural soil structure. This can be so extensive that water may remain on the soil surface for several days after irrigating or rainfall. Remedies for compacted soils are costly, and results are often fair at best. The best policy is to manage the vineyard floor so that compaction and its impact on production is minimized.