



Maryland
Green Registry
MEMBER

The Maryland Green Registry promotes and recognizes sustainable practices at organizations of all types and sizes. Members agree to share at least five environmental practices and one measurable result while striving to continually improve their environmental performance.

The Vineyards at Dodon LLC



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Vineyard
Member since July 2024

Management and Leadership



Environmental Policy Statement

The Vineyards at Dodon, with the collective experience, education, and skills of our team, is dedicated to serving nature, our community, and our families. We believe that sustainability alone is not enough to ensure a habitable planet. Our commitment is guided by Orgel's Second Rule: "Evolution is cleverer than you are."

Our specific aims are to:

- *Enhance biodiversity*
- *Restore ecosystems*
- *Regenerate soil health*
- *Eliminate pollution*
- *Improve local food security*
- *Strengthen the social environment*
- *Use our platform within the wine industry to educate the public about nature*



Environmental Team

Tom Croghan, owner and winemaker, leads Dodon's environmental efforts in collaboration with all members of the Dodon team. Each full-time team member is committed to at least one specific environmental project to improve our operations' effectiveness continually. For example, Dodon's Manager of Client Services is responsible for enhancing recycling.

Annual Environmental Goals

- *Remove and store 250 tons of atmospheric carbon dioxide annually*
- *Reduce insecticide use by 50% and fungicide use by 10% over current baseline*
- *Reduce eutrophication by 50% over current baseline*
- *Renovate 2 acres of ephemeral stream and wetland ecosystem*
- *Plant 300 trees (2-year goal)*
- *Install 2 acres of perennial food forest (3-year goal)*
- *Reduce bottle weight by 20%*

Environmentally Preferable Products and Services

Dodon produces 30,000 bottles of premium, age-worthy wine annually. Because alternative packaging, such as kegs or bag-in-box, can only be used for wine meant for immediate consumption, i.e., less than nine months after bottling, we use glass bottles exclusively. Bottles represent [60% of our greenhouse gas \(GHG\) emissions](#).

To address this challenge, we have reduced the weight of our glass bottles for our cuvée offerings from 600 grams to 400 g and 500 g to 400 g for the house wines, representing a reduction of about 2.5 tons of CO₂e emissions annually.

Dodon has eliminated capsules and uses natural cork closures. Each cork represents 309 grams of net CO₂ removals (a total of 9 tons). Because we are concerned about plastic pollution, we have decided against granulated cork stoppers, which use polyurethane glues, and bag-in-box packaging.

While we have reduced bottle weight by 20%, our long-term goal is to adopt reusable glass bottles. Assuming that we can reuse each bottle an average of 15 times, we would reduce CO₂ emissions by about 15 tons annually. We are working with Revino, an Oregon company that seeks to open an East Coast reusable bottle operation, and colleagues at MDE, New York, and Europe to develop the infrastructure needed to make this a viable option for the wine industry.

Environmentally Preferable Purchasing

Dodon has adopted a values-based purchasing process that evaluates suppliers based on product quality, sustainability and waste, commitment to social equity and employee well-being, and animal welfare. You can find a more detailed description [here](#).

Environmental Restoration and Community Environmental Projects

We use the Stockholm Resilience Institute's [planetary boundaries framework](#) to set priorities. Excessive atmospheric carbon dioxide, biodiversity and forest loss, nutrient pollution of waterways, and chemical and plastic pollution are the chief environmental

threats to a habitable planet. As winemakers and farmers, we have the opportunity and the obligation to address these challenges.

Enhancing biodiversity and restoring ecosystems

Despite its importance, the world has [failed](#) to respond adequately to catastrophic declines in biodiversity, endangering fresh water, clean air, food supply, health, and security. The World Wildlife Fund estimates that, on average, populations of the 4,400 monitored vertebrates have [declined](#) by more than two-thirds since 1970. During this same time, nearly 3 billion birds, about 30% of the total, have “[vanished](#)” from North American skies, partly due to the [loss of the insects](#) they depend on for food.

Reduced habitat is the primary cause of biodiversity loss. [Some studies](#) have found abrupt declines when habitat is reduced to less than 30% of the landscape, but the effects vary with species and the [nature of the disturbance](#). [Biodiversity loss](#) can thus be very significant, even with minor disruptions in relatively untouched habitats, leading to proposals to conserve [substantial portions](#) of the world’s ecosystems.

To restore habitat, we encourage native, low-growing grasses and forbs between vine rows by crimping rather than mowing tall grasses that out-compete other desirable species. Pollinator meadows, hedgerows, and other natural areas offer beneficial insects and wildlife food, shelter, and places to breed and raise their young.

In 2018, we installed three acres of meadows with 28 native grass and forb species, including Rudbeckia, Asclepias, Solidago, and Heliopsis spp., contributing to ecosystem benefits and season-long beauty. In 2023, we planted 1600 trees and shrubs as hedgerows. Several species, such as Corylus americana (American hazelnut), Prunus angustifolia (Chickasaw plum), and Castanea pumila (dwarf chestnut), were once essential food sources for the first peoples of our region.

In addition to their benefits to biodiversity and as a food source, 1000 of these trees are loblolly pine that will create a tall hedge between the vineyard and its suburban neighbors, reducing the [light pollution](#) that disrupts avian and insect populations.

Regenerating soil health

Healthy soil with good structural properties, diverse microbial life, and abundant organic matter improves stormwater infiltration and holding capacity, nutrient cycling, pest resistance, greenhouse gas sequestration, and yield. At Dodon, we rely heavily on the tools of agroecology to regenerate the soil extinguished by more than three centuries of “conventional” agriculture. Our goal is to accelerate, as much as possible, the natural soil-building processes that once dominated the region.

We start by limiting tillage to the area under the vines and cultivating diverse cover crops in and around the vineyard. After experimenting with non-native cover crops like mustard, radishes, and annual ryegrass, we've learned that spontaneously growing, perennial grasses and forbs adapted to the local environment are best.

Our recent surveys reveal up to thirty [different plant species](#) per square meter. This extraordinary [plant diversity](#) is associated with improved soil structure, diverse microbial populations, large below-ground [invertebrate populations](#), excellent water infiltration and storage, and high soil oxygen content.

Second, we apply organic amendments that add carbon and other essential nutrients to the soil. Using a foundation of [ramial woodchips](#), we balance the compost with [duckweed](#). This rapidly growing aquatic plant scavenges the nutrients in the runoff from Dodon's horse pastures. We also add the byproducts of our winemaking – spent yeast, stems, and skins – and food scraps. These practices both build soil and reduce the eutrophication that results in [Bay's dead zones](#).

We incorporate [indigenous microorganisms](#) into the compost using soil from the surrounding forest. These bacteria, fungi, and archaea interact with grapevine roots, [suppressing disease](#) by improving vine nutritional status, activating plant defense mechanisms, secreting antimicrobial substances, and increasing tolerance to injury. They also produce complex macromolecules, such as ascorbic acid, terpenes, and polyphenols, that defend the plants and make flavorful wine.

Finally, we integrate herbivorous grazing animals, or ruminants, into the system, supplying the new populations of microbial detritivores necessary for carbon, nitrogen, and phosphorus cycling. Our pasturing method, formally known as adaptive multi-paddock grazing but more commonly called "MOB" grazing, reproduces the [evolutionary patterns of early grazers](#) that may have allowed the earth to cool following the [mid-Miocene climatic optimum](#).

Carbon Capture and Storage

At Dodon, our 31,000 grapevines use solar energy to remove carbon dioxide from the atmosphere, combine it with water, and transport the resulting sugars to the soil, where they are stored for decades in the biodiverse conditions that our soil health practices create. We can quantify the benefits of these practices by measuring changes in soil organic matter (SOM) over time.

Over eleven years, the SOM in the vineyard has increased tenfold, from 0.3% to 3.2%. This represents the removal of more than 300 tons of CO₂ annually, more than offsetting the approximately 50 tons of emissions from farm and winery operations. In other words, at Dodon, we remove and store about 250 tons of CO₂, equivalent to the emissions from about 30,000 gallons of gasoline.

The importance and complexity of atmospheric carbon removal by technology or agriculture have not received adequate attention from the State. For example, although the Intergovernmental Panel on Climate Change, the National Climate Assessment, and the [Maryland Climate Pathway](#) have concluded that directly removing CO₂ from the atmosphere is the only path to a habitable planet, Maryland's [State Plan](#) alarmingly does not mention the need to develop and deploy carbon capture and storage technology rapidly.

Similarly, the Maryland Department of Agriculture (MDA) [failed to seize](#) the opportunity offered by the 2017 Healthy Soils legislation. Instead, the State assumes that direct-air carbon capture and storage technology will be widely available in the next decade. These projects are complicated and expensive. Despite considerable federal subsidies and venture capital, implementation has been [distressingly slow](#).

In his charming book "Pastoral Song," author and farmer James Rebanks calls the type of farming we do "economic suicide." We estimate that we spend 50% more on our farming than we would if we used more conventional methods.

Although [Microsoft has contracted with CCS start-up Heirloom Carbon Technologies](#) to offset the 315,000 tons of annual CO₂ emissions from its data centers, paying an estimated \$800 – 1000 per ton, our small operation has not identified venture capital, market payments, or subsidies to execute its nature-based carbon capture solution. Fortunately, we can use grapes, a byproduct of an unpatentable but very effective direct air carbon capture system, to produce wine and sell it to pay the costs.

Educating the Public About Nature

As a winery, Dodon frequently interacts with the public. We take seriously the obligation to use this opportunity to inform people about the challenges imposed by biodiversity loss, ecosystem degradation, and climate change and the need to adapt to and mitigate these problems.

Dodon has nearly 6,000 annual visitors who experience first-hand the beauty of nature and its products. More than 2,500 join a tour demonstrating our farming practices, their reasons, and their benefits to the environment. Dodon's staff present to local, state, national, and international trade and lay audiences, share information via a [website blog](#) and guest [newspaper commentaries](#), participate in government affairs activities of state and national trade associations, and testify before the Maryland General Assembly.

Dodon's owner and winemaker served on MDA's Soil Health Advisory Committee and as vice president of Future Harvest, a regional regenerative agriculture organization that trains new and experienced farmers in these crucial methods. He is also a member

of the lead team of [The Porto Protocol's Living Vineyards](#) project, which aims to help 20% of all vineyards worldwide adopt at least one ecosystem restoration project by 2030.



Aspirational or Long-Term Environmental Goals

Reducing food insecurity

Maryland's food system is at the confluence of increasing chronic disease, escalating environmental degradation, and growing recognition of racial injustice. Not addressing these challenges will only make them worse. Before the COVID-19 pandemic, food directly contributed to four of the five [leading risk factors of death and disability](#). Nearly 40% of American adults are [obese](#), an increase of more than 37% since 2000. In addition, diabetes-related disability – blindness, kidney failure, heart attacks, and limb amputation - has [increased by nearly 25%](#) since 1990.

To address this challenge, Dodon has partnered with the Chesapeake Bay Foundation's Clagett Farm to make their fresh fruits and vegetables available to our community, offers grass-fed lamb for sale, and planted 600 fruit, nut, and vegetable trees. We aspire to add non-alcoholic beverages, cider, fresh fruits and flowers, and a permaculture food forest to our product offerings.

Strengthen the social environment of our community.

Compared with other agricultural products, wine has an [outsized influence](#) on human societies and cultural identity. We have individual and collective responsibility for our effect on social and economic well-being, an obligation that extends beyond the farm's borders.

Dodon has always been an open, welcoming environment where all visitors can enjoy each other in a warm, convivial, natural setting. As noted, we also emphasize education and experiential learning, and we have implemented policies, such as a no-tip policy, that seek to minimize discrimination and harassment.

Despite these successes, we aspire to have a more significant impact on our community. Thus, we are evaluating a new opportunity to create a retreat center for organizations that wish to discover the relationship between agriculture, health, and the environment and how they might contribute to a healthier environment.

Waste



Solid Waste Reduction and Reuse

Dodon does not have a formal solid waste reduction program. As a matter of policy and company culture, we reuse or repurpose as much as we can. For example, wine barrels are repurposed for other industries (e.g., beer and spirits) and as furniture, rain barrels, and flowerpots when they have exceeded their reasonable life.

As noted, we are actively working with the industry and MDE to establish a regional bottle reuse program, and we have evaluated using cages in place of boxes for wine sold on the premises.

Recycling

While we have prioritized recycling, there are structural barriers that we have not yet been able to overcome. Although we send nearly eight tons of wine bottles to Anne Arundel County’s single-stream recycling program, these are not yet recycled, such as crushing for use as sand for road construction. Although pallet wrap is recyclable for furniture and decking, we have not found a local redemption center. The same can be said for the 25,000 corks that we accumulate annually. Sadly, these all end up in landfills.

Despite these challenges, we estimate we recycle about 5 tons of cardboard annually and a half-ton of used pallets.

Composting

As mentioned in the section on soil health, Dodon has an active compost program. In addition, food scraps are often used to feed our chickens.

Hazardous Waste/Toxic Use Reduction

Pesticides, carbon, and plastic are Dodon’s most significant potential sources of toxic pollution. In other sections, we have described the challenges associated with [plastic pollution](#) and the decisions that we have made to minimize it. Our work to reduce fuel use will be discussed in the energy section.

The SRI uses the term “[novel entities](#)” for substances with significant and persistent detrimental effects on the environment. These include synthetic chemicals (pesticides, plastics, etc.), GMOs and other changes to evolution, organic pollutants, and naturally occurring substances mobilized by anthropogenic activity. Most “organic” pesticides—i.e., those certified by the National Organic Program (NOP)—fit into this latter category. For example, although many formulations of copper meet NOP criteria, copper is [toxic](#) to humans and the environment.

Thus, Dodon has opted to assess the use of toxic and potentially toxic substances based on all pesticide use, not just synthetic pesticides. We seek to reduce our chemical and physical footprint in the vineyard. Our primary strategy has been to enhance biodiversity and soil health to create healthy plants and reduce their susceptibility to pest pressure.

In a salient example, we have reduced our chemical footprint while increasing biology in the vineyard by including crab meal (ground crab shells reduced to a powder form) in the sheep’s winter ration in 2022 after observing an increase in powdery mildew infection, a common pathogen associated with ascomycete fungi.

Ascomycetes have chitin, the main protein component in crab shells, in their cell walls. When fed to ruminants, crab shells stimulate the growth of chitinase-producing microbes, which are deposited throughout the vineyard in the feces. By enhancing this biology, we have reduced the use of sulfur, an organic pesticide, and synthetic pesticides.

We have established flocks of chickens, geese, and guineas that consume insect pests, reducing insecticide use, and we have installed kestrel nesting boxes to minimize bird and rodent pest pressure.

Despite increasingly difficult climatic conditions, we have reduced insecticide use by 85% and fungicide use by a third over the past decade. According to the University of Maryland Extension, a well-managed vineyard can expect to apply pesticides 17 times during the growing season. Dodon applies them 11 times per season.

Energy

Energy Efficiency

Dodon uses a geothermal heat pump system to heat and cool the winery. The barrel room and warehouse/storage areas are underground, and we have installed closed-cell foam insulation in all refrigerated areas that are not underground. Almost all areas of the facility have been converted to LED lighting.

Renewable Energy

In 2016, Dodon installed a 21.6 kW solar system. To date, we have generated more than 775,000 kWh.

Transportation

Employee Commute/Customer Travel

All employees live within 10 miles of the farm, and three live on the farm. About 70% of our sales are to members of the Dodon Wine Club, who receive six bottles of wine every six months. By encouraging batched purchasing, we incentivize fewer trips to the farm for just one or two bottles.

Efficient Fleet Vehicles

Dodon uses two 70-horsepower diesel tractors in the vineyard. While conditions broadly define their use, we are committed to reducing our physical footprint by cutting the number of tractor passes. We have trimmed pesticide applications, and thus tractor passes by six. Crab meal is typically applied using a broadcast spreader. Feeding it to the sheep eliminates one pass. Grazing the sheep and changing to a roller-crimper has eliminated bi-weekly mowing during the growing season, or approximately ten additional passes per year.

Each tractor pass requires 15 gallons of diesel fuel. Thus, we have reduced diesel use by 255 gallons, corresponding to a reduction of 3 tons of [CO₂e emissions](#).

Dodon does not have a passenger vehicle fleet. We have explored the possibility of moving to electric tractors, but these are not financially feasible.

Water

Water Conservation

Dodon's soil health practices have enhanced vineyard water storage capacity, reducing irrigation needs. We have not irrigated the vineyard since 2018.

Stormwater Management

Dodon's winery is regulated by MDE and meets all requirements regarding point source water pollution.

Dodon's soil health practices, including cover crops, facilitate stormwater infiltration, reducing nutrient and pesticide runoff and erosion. These methods have virtually eliminated the need for fertilizer. Studies show that cover crop use in agricultural settings scavenges 30% of the nutrient load. Adding woody perennial plants, such as grapevines and trees, [increases nutrient retention by 50-75%](#).

Environmental Certification Programs, Awards, and other Activities

Dodon is recognized [nationally](#) and [internationally](#) for its regenerative farming practices and work to [mitigate climate change](#). For example, Dodon participates in the America the Beautiful [Freshwater Challenge](#) sponsored by the White House Council on Environmental Quality.

We have investigated organic and regenerative organic certification, which, as described in the section on reducing toxic chemistry, may not offer significant environmental or human health advantages. We estimate that the change from synthetic to NOP-allowable pesticides would require four to six additional tractor passes, eliminating the GHG benefits of our current pesticide management.

We are considering other certification programs, such as B-Corp, the Savory Institute Land to Market Certification, and [Regenified](#). While these programs are consistent with our values, the initial application requires considerable time, effort, and capital that must be weighed against the marginal (financial) returns.



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Learn more at green.maryland.gov

