Windbreaks

Creating a windbreak around your home or ranch will not only make the protected area more pleasant during windy periods, it will provide privacy, save on household energy consumption, and create a favorable microclimate in the wind sheltered zone. The windbreak need not be created using live plant material. On small, residential properties, a well-designed, strategically placed fence may be a better choice due to space limitations. If you choose to use a living windbreak, then it is best to plan before you plant. Some important considerations include: water availability for irrigation, plant size and spacing, pests and diseases, wind direction, aesthetics, and plant species.

Wind is a mass of air moving horizontally in response to changes in atmospheric pressure. As wind blows against a windbreak, air pressure builds up on the windward side (the side towards the wind), and large quantities of air move up and over the top or around the ends of the windbreak. Windbreak structure - height, density, species composition, length, orientation, and continuity - determines its effectiveness in reducing wind speed and altering the microclimate.

Windbreak height is the most important factor determining the downwind area protected by a windbreak. On the windward side of a windbreak, wind speed reductions are measurable upwind for a distance of 2 to 5 times the height of the windbreak. On the leeward side (the side away from the wind), wind speed reductions occur up to 30 times the height of the windbreak downwind of the barrier.

The reduction in wind velocity behind a windbreak leads to a change in the microclimate within the protected zone. Temperature and humidity levels usually increase, decreasing evaporation and plant water loss. Soil temperatures in sheltered areas are usually slightly warmer than in unsheltered areas. Taking advantage of these changes in microclimate may allow earlier planting, increased production, and can alter the microclimate to allow otherwise temperature sensitive perennial plant species to thrive in the protected area.

The prevailing wind direction in our area is from the southwest. This may vary depending on adjacent time of year, topography, vegetation, and structures. Once you have lived in the area for a while, you will have noticed which direction the prevailing winds blow. It is very helpful to create a scale drawing of your property that includes structures and existing vegetation beforehand. Windbreaks also provide thermal protection for livestock, wildlife habitat, and firewood.

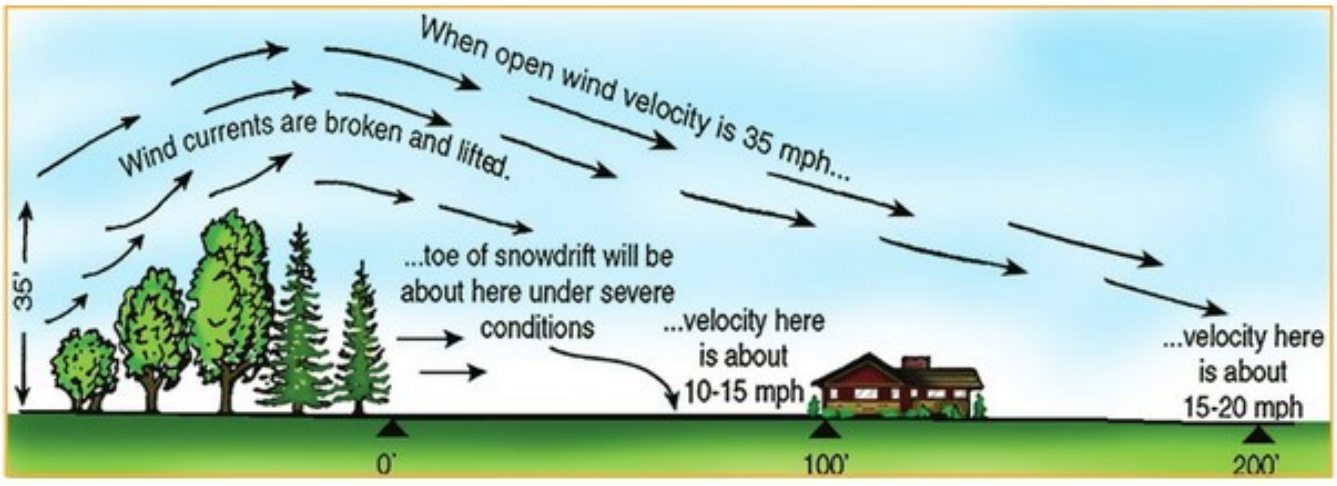

Diagram showing a windbreak and relationship between windbreak height and the subsequent impact on wind velocity (from: Tree Windbreaks for Farms and Homes, Purdue University Extension).

Suitable Plant Species

Design and composition of a living windbreak depends on the space available and the species and size of trees. You may think that cost is a consideration, but this is not always true. Plants may be just as costly in the long run and you will have to wait for them to grow before they effectively reduce winds. Green plants may be more attractive, but they require maintenance and do not create an effective barrier to animals like javelina, rabbits, and deer.

Living windbreaks should include a diverse species of trees and shrubs. Plant species diversity minimizes insect and disease problems. Planting a monoculture windbreak (all the same species) leaves the windbreak more susceptible to new diseases that may occur over time.

The following plants do well in our area and are considered low water-use, but even low-water use plants, require some irrigation.

Evergreens: Arizona cypress, deodar cedar, atlas cedar, Austrian pine (branches close to ground), Japanese black pine, Junipers (Spartan, Blue Point, Wichita)

Deciduous: live oak, black locust, honey locust, mulberry, Chinese pistache, mesquites (not very tall, but will survive without irrigation after establishment)

Evergreen shrubs such as Photinia and Nandina could fill in gaps between trees. Use your imagination and create the perfect combination of living and constructed features for your unique situation.

Avoid plants that require a lot of water, such as willows and cottonwoods. Avoid Elderica pine and Leyland cypress, as they are prone to disease.

Diverse planting of pines and cypress (Mary Barnes).

Monoculture planting of Leyland cypress diseased with Seiridium canker (Mary Barnes).

Additional Information

Prescott Area Plant List
University of Arizona Cooperative Extension, Yavapai County

Verde Valley Plant List
University of Arizona Cooperative Extension, Yavapai County

General Irrigation Guidelines
University of Arizona Cooperative Extension, Yavapai County

January 8, 2023

Adapted from original Backyard Gardener publications by Jeff Schalau, Agent, Agriculture & Natural Resources, University of Arizona Cooperative Extension, Yavapai County