



Windbreaks & Shelterbelts (CPS 380)

Part of Fibershed's Carbon Farming Education program, learn more online at: fibershed.org/carbon-farming



Benefits of Windbreaks & Shelterbelts

- ▶ Reduce wind speed, dust and noise
- ▶ Modify the micro environment; enhancing plant growth, reduce evaporation and moderate soil temperatures
- ▶ Reduce soil erosion, nutrient loss, chemical drift
- ▶ Increase carbon sequestration in soils and vegetation
- ▶ Increase surface water infiltration and groundwater recharge
- ▶ Increase biodiversity and forage
- ▶ Improve wildlife habitat
- ▶ Add protection for livestock to reduce stress and improve health



Planning and Designing Windbreaks & Shelterbelts

- ▶ Determine your primary goal(s) to guide design. Take into account land topography, drainage, and utilities. For example, choose a site to block prevailing winds, visual screen.
- ▶ Consider the following key features that modify wind and air flow:

Height: Effective height of a windbreak determines the reduction in wind speed and the distance of downwind sheltered protection.

- Reduces wind speeds by approximately 2 to 5 times the height
- Reduces downwind speed for an approximate length of 10 - 30 x height. *For example: A windbreak with a height of 10 feet will reduce downwind speed for a distance of 100 - 300 feet.*

Density: Dense windbreaks have maximum wind reduction but shorter areas of protection, while less dense windbreaks will have less wind reduction but longer wind shadows.

Orientation: Windbreaks are most effective when oriented at right angles to prevailing or troublesome winds.

Length and Width: Width depends upon single or multi row installation. The length of the windbreak should be at least 10 times the height of the tallest trees, and should extend past the width of the area needing protection to account for changing wind directions.

Spacing/ Continuity: It is critical that wind barriers do not have any gaps. A gap creates an "end effect" that generates higher winds in the gaps, reducing its effectiveness. Wind speed increases in gaps in the windbreak can result in damage or complications downwind.

- Space trees within a row on average 6 - 20 feet apart (based on number of rows and tree type), while shrubs should be spaced 4 - 6 feet apart
- Spacing between rows ranges from 12 - 20 feet
- ▶ Consider your access and terrain to determine the best type of irrigation system such as drip irrigation, hand water or pump water.
- ▶ Plan for protection from animals, including sleeves, caging, fencing; and weed protection such as wool or weed mat.

"Agricultural land management practices can measurably increase rates of carbon sequestration, resulting in enhanced soil quality, soil water holding capacity, increased soil carbon and forage production."

– Ryals and Silver 2013



Plant Selection in Windbreaks and Shelterbelts

- ▶ Choose regionally adapted plants compatible with the soil, water availability, wind adaptability and light conditions of your site.
 - Choose a diverse range of species of trees and shrubs to create a moderately dense foliage cover from the ground to treetops to achieve the desired wind shadow.
 - Calflora Planting Guide: <https://www.calflora.org/entry/palette.html>



Managing and Maintaining Windbreaks & Shelterbelts

- ▶ Maintenance is required during establishment of plants for the first 1 to 4 years.
- ▶ Weed control: utilize thick mulch around plantings, implement target grazing or hand pull.
- ▶ Monitor irrigation and plant protection structures regularly for any damage.
- ▶ Avoid unnecessary pruning or trimming during spring through mid-summer when you are likely to disturb nesting birds.
- ▶ Until plants are established, they will need to be watered regularly during the dry months.
- ▶ Replacement of individual plants that do not survive may be necessary.



Complementary Practices

- ▶ Mulching (CPS 484)
- ▶ Compost (CPS 808)
- ▶ Irrigation System (441)
- ▶ Fencing (CPS 382)
- ▶ Weed management (CPS 314/315)
- ▶ Prescribed Grazing (CPS 528)
- ▶ Integrated Pest Management (CPS 595)
- ▶ Windbreaks/Shelterbelts Renovation (CPS 650)



Technical Support

- ▶ Resource Conservation District (see CARCD's [website directory](#) to find one serving your area)
- ▶ Natural Resources Conservation Service (see NRCS's [service center locator](#) to find which office serves your area)
- ▶ UC Cooperative Extension (see their [offices locator](#) to find which office serves your county)



References: See Resource Guide

- ▶ NRCS Windbreak Planning Workbook
- ▶ University of Missouri Center for Agroforestry, Training Manual for Applied Agroforestry Practices – 2018 Edition:
http://www.centerforagroforestry.org/pubs/training/chap6_2018.pdf



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