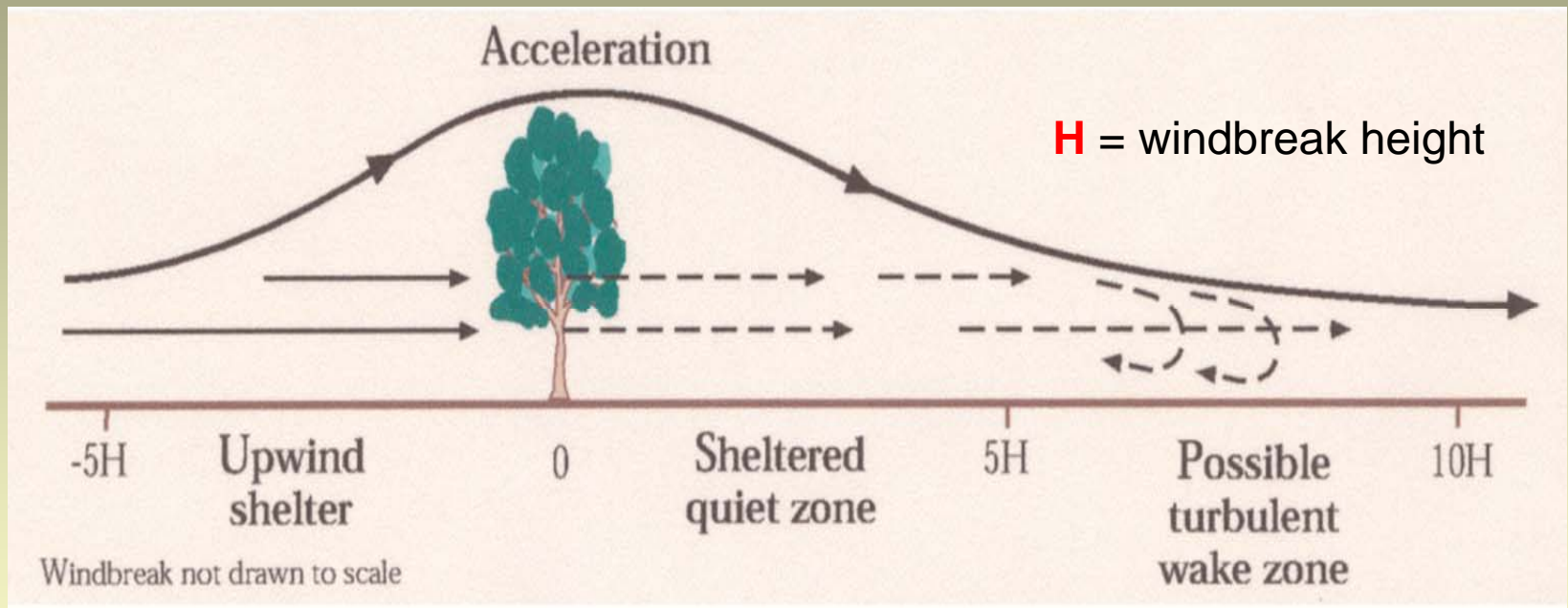


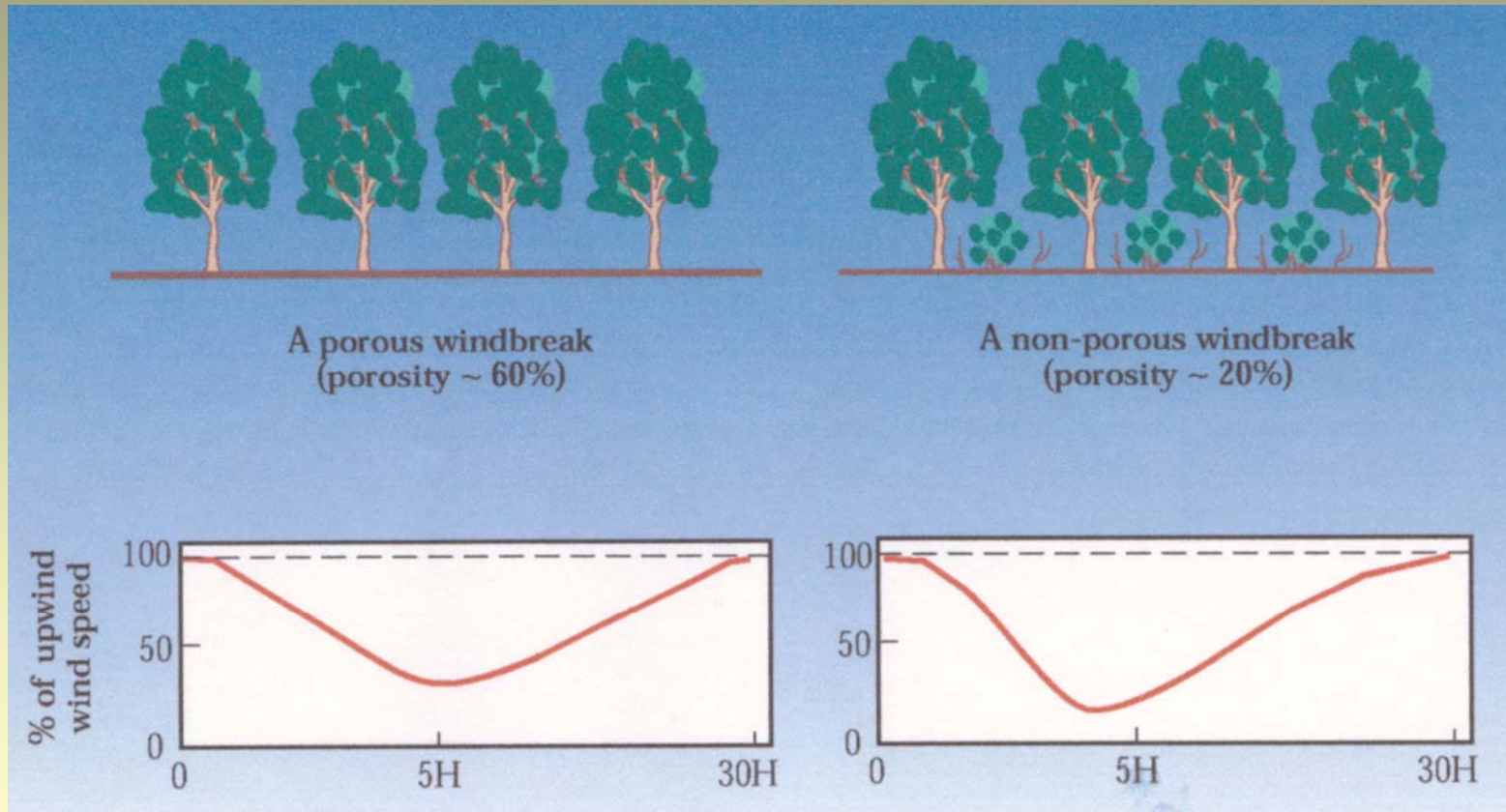
Design and Cultural Considerations for Living Windbreaks



- Reduce wind speed.
- No eddies.
- No added turbulence.

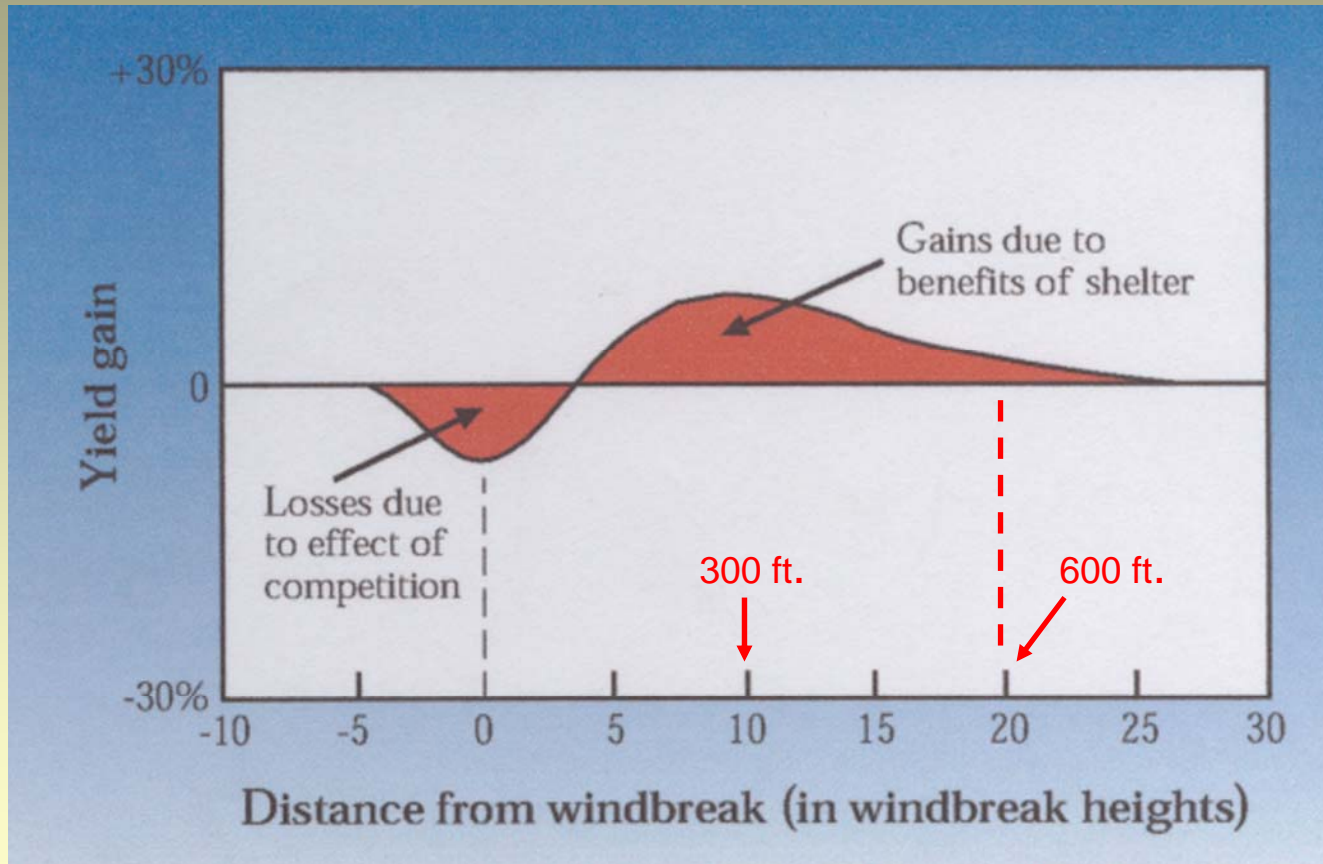
These are the result of DESIGN.

Design and Cultural Considerations for Living Windbreaks



To optimize function, one needs to select the [right plants and spacing](#).

Design and Cultural Considerations for Living Windbreaks



To optimize function, one needs to select the **right plants and spacing**.

Design and Cultural Considerations for Living Windbreaks

POINT

Horizontal protection is directly proportional to windbreak height.

IMPLICATIONS/APPLICATIONS

1H tall = 10H lateral.

Fast growth is of the essence, but can plants be too tall? (shade, etc.)

Is there an ideal height? **40 - 50 feet**

- 10-acre units formed by dividing a section are 330 ft wide x 1320 ft long.
- Windbreaks on the long sides should provide 2x protection, so they could be planted every 20 acres.
- On the short side, a 50-foot windbreak will provide 500 ft in each perpendicular direction.
- **20 acres**: A perimeter windbreak and one across the middle = **4620 lineal feet** ($\frac{7}{8}$ miles).

Design and Cultural Considerations for Living Windbreaks

POINTS

- Maximum wind reduction is closely related to porosity.
- To meaningfully reduce wind speed near ground level for the longest distance, dense windbreaks are less effective than porous ones.

IMPLICATIONS/APPLICATIONS

What determines porosity? **Plant traits and spacing.**

Know your plants.

Pines and red cedars have different traits.

Ex: pines and cedars

Interplant or plant offset separate rows?

Zephyrhills grove – 8 ft between pines; interplant with cedars.

Spacing largely dictates porosity!

Many plants will change their normal shape with spacing.

Design and Cultural Considerations for Living Windbreaks

POINT

The extent of horizontal effect is similar for medium- and low-porosity windbreaks.

IMPLICATIONS/APPLICATIONS

PLANT HEIGHT trumps porosity/spacing!

Plant spacing ranges are presented in the notebook tables. Choosing any spacing within the range would be satisfactory. They are probably not important except as they affect **COST**.

Don't overplant.

In the **20-acre example**, for 4620 lineal feet:

770 plants @ 6 ft.

1,155 plants @ 4 ft. (33%)

Design and Cultural Considerations for Living Windbreaks

POINT

Windbreak plants that are not as wide as they are tall and have steep sides give better wind reductions over longer distance than very wide or streamlined windbreaks.

IMPLICATIONS/APPLICATIONS

Good choices of plant materials properly spaced will yield best results. Study the tables, study your local situation, then select.

You can plant single-row windbreaks and expect good results.

Design and Cultural Considerations for Living Windbreaks

POINT

- Single-row windbreaks can provide wind reduction over as great a lateral distance as multi-row windbreaks.
- In multi-row windbreaks for reducing wind speed over large areas, the first row has the greatest impact.

IMPLICATIONS/APPLICATIONS

If using the pine/cedar system, which plant is “outside?” **Plant cedars inside because they are slower growing and shorter.**

Plant single-row windbreaks? **Maybe, but most tall plants (those labeled FOUNDATION in the notebook tables) do not have adequate foliage near ground level. A second species is needed (see FOUNDATION PARTNERS in notebook tables).**

Single-row versus double-row? **Double-row WBs have two distinct advantages: (1) two species is risk management; (2) gap protection.**

Space for only one row? **Eucalyptus, closely spaced. Artificial WB.**

Design and Cultural Considerations for Living Windbreaks: Literature

POINT

The area of sheltered grove/unit area of land given over to windbreaks is maximized with tall, fast-growing trees.

IMPLICATIONS/APPLICATIONS

Living windbreaks have 3 dimensions: ht, width, thickness.

Most benefit is derived from **height**.

The ht. factor is a benefit because citrus **groves** are not particularly windbreak-friendly. They present mostly **constraints**.

Need room to move equipment; flatwoods – ditch maintenance.

Retrofitting an existing grove for windbreaks may require removing trees from the ends of rows..

Q. Large ratio Sheltered land / windbreak land area ??

A. Plant tall, fast-growing trees carefully selected and spaced.

Design and Cultural Considerations for Living Windbreaks: Other Factors

Q. What about aerial applications?

A. Fixed wing: height not an issue; need ~1400 ft. flight line.
Rotary wing: height not an issue; need 30 ft. from
windbreak to adjacent row.

Q. Planting near a building like a greenhouse?

A. A single-row, upper story windbreak might be satisfactory
and its height may not need to exceed the building's,
or,
Plant a more streamlined shelterbelt for extra protection.

Windbreak **Design** Guidelines and Suggestions

- Rules: Height (10:1), porosity, spacing.
- Spend some time looking around your area. Use species adapted to your area and site. Soils may change where you plant windbreaks, thus, need to use different species?
- Spend some time reading.
- Choose what groves to protect. Prioritize if necessary according to varietal susceptibility.
- Determine if you have space for a single or double row. *Plant double offset rows if possible.*
- Plant all sides.
- Consider air drainage, equipment movement, and ditch maintenance.
- Plan around 20-acre units.
- In general most **Foundation plants** can be grown at spacings between 3 to 8 ft in the row and likewise between rows.
- Give consideration to using different plants for the perimeter versus interior windbreak, and combinations of living and artificial windbreaks.

Guidelines and Suggestions: Cultural Practices

- Irrigate and fertilize, or not? *Eucalyptus* –YES, others?
- *Pine trees* DO NOT grow well in pHs ≥ 6.5 , but unless soil horizons from where the ditch is excavated contain calcareous materials, the ditch bank is relatively undisturbed and may not be problematic. A consideration in developing new sites; an issue to be checked if retrofitting. (See E. Jokela reference in notebook.)
- *E. amplifolia* requires fertile sites to grow best.
- P levels are important for *E. grandis* and *amplifolia*.
- Eucs respond well to intensive culture.

A Permanent "Living" Design Example

