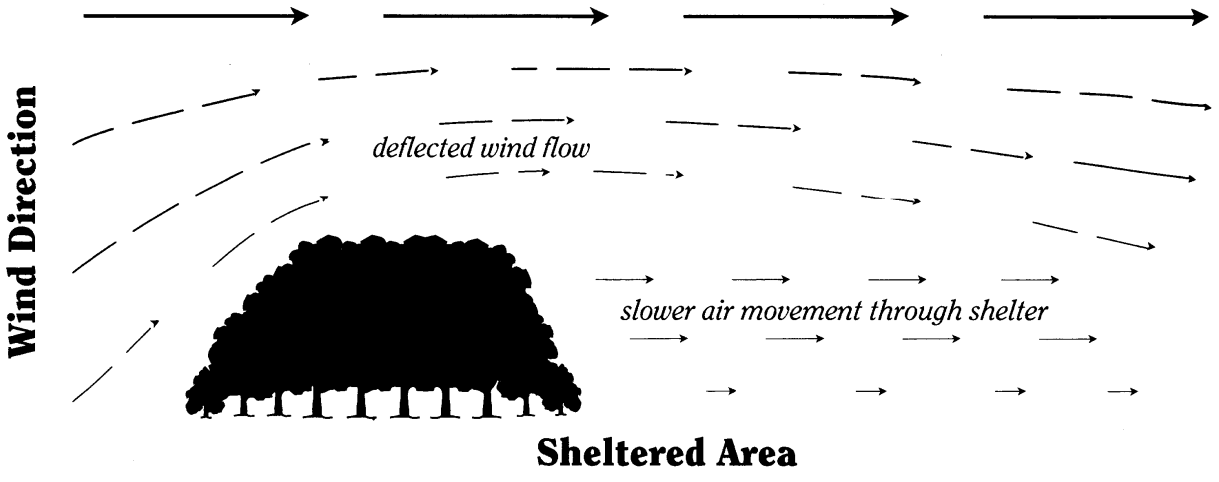
Creating a Shelterbelt *by John Davis of Tree Shop Ltd.*

The creation of shelterbelts is one of the most necessary, strategically important and rewarding of any landowner's stewardship of his property. Creating microclimates, linking habitats, conserving water, diminishing flooding, preventing soil erosion, enhancing biodiversity and noise avoidance all rely on a dynamic layout of linking shelterbelts, which then also become 'green lanes' for extending both flora and fauna. Across the world these benefits are being increasingly recognized and quantified. In extreme cases in Africa, crop yields have shown an overall increase of 20% after allowing for land area lost to trees. In fact most crops and stock will show a positive yield response to shelter. Even buildings suffer less heat loss as the wind speed and hence chill effect diminishes.

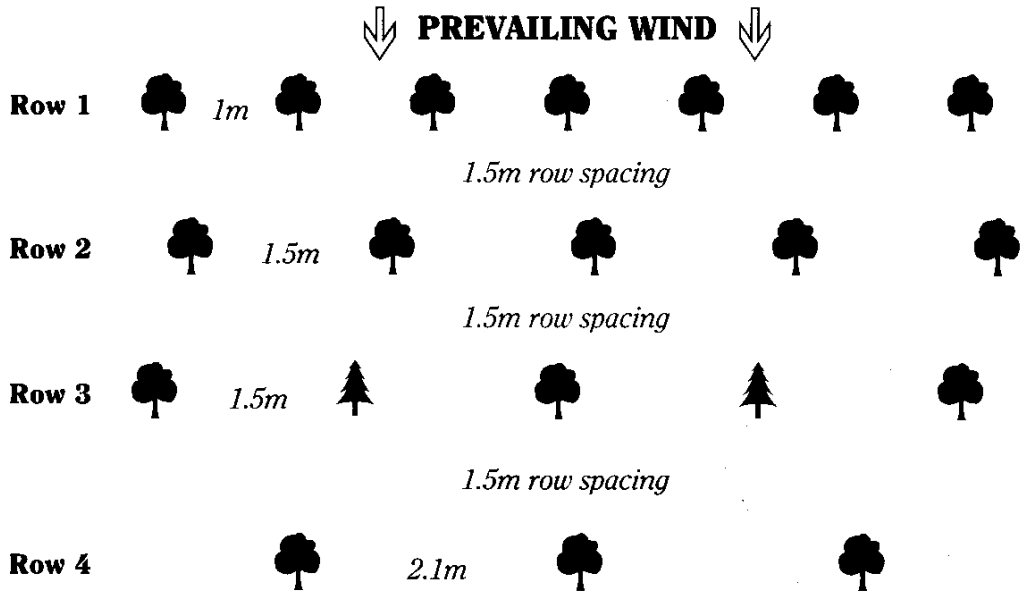
The shelterbelt at work



A shelterbelt can be little more than an extended hedge. Indeed a small amount of land as little as 5 metres wide planted with four rows of trees will provide an effective shelterbelt. When creating a shelterbelt a few simple to understand principles can make a dramatic difference to both its effects and results.

These principles can be encapsulated in eight practical rules

Optimum planting layout for a conservation belt of timberbelt – one side only



Row 1: Shrubs/hedging. 100 per 100m stretch. *(e.g. Hawthorn, Blackthorn, Buckthorn, Guelder Rose)*

Row 2: Minor Broadleaves. 67 per 100m stretch. *(e.g. Crab Apple, Hazel, Birch, Rowan, Holly, Willow)*

Row 3: Minor Broadleaves/Conifers. 67 per 100m stretch. *(e.g. Larch, Norway Spruce, Alder, Cherry, Holm Oak)*

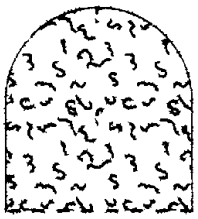
Row 4: Major Broadleaves. 48 per 100m stretch. *(e.g. Aspen, Sycamore)*

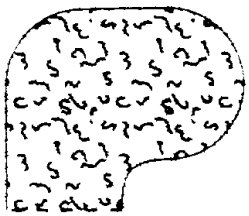
Eight practical rules for shelterbelt planting

1. Width.
Plant four rows of closely spaced fast growing trees and shrubs, which will grow to different heights at differing rates as detailed bottom left, carefully observing the spacing between rows and trees. Plant in staggered groups of three, five or seven of each species as preferred.

2. Length.
Aim for a minimum length of 25 times the height of the tallest trees. This will ensure the wind does not reduce the sheltered area to a triangle by being forced around the edges.

3. Ends.
Reduce the planting density towards the ends. Round all corners, and if possible try to accommodate a small leg at each end to increase the effect of edge protection.



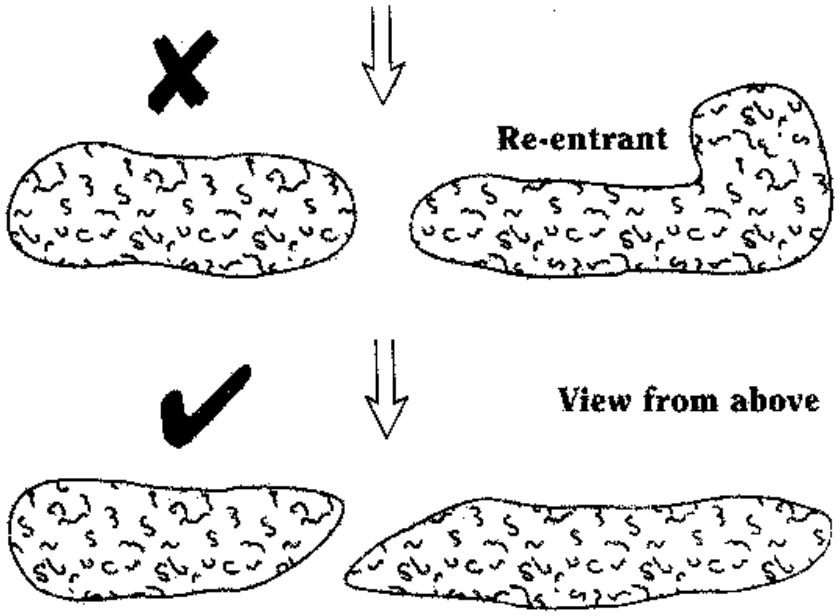


4. Permeability.
The most effective shelterbelt will incorporate open areas between trees, branches and leaves to a ratio of about 50%. A higher percentage allows too great a windspeed through lower areas, whilst a lesser figure created by dense foliage such as Lawson Cypress, can cause turbulence. Some thinning will be

required over time, but no pruning should be undertaken on the outer rows.

5. Gaps.

Avoid gaps, openings and re-entrants. If unavoidable, such as in the case of gateways, then it is best to design oblique re-entrants to the prevailing wind, or build an avenue leading to it



6. Regeneration.

Regenerate old and ineffective shelterbelts by planting three new rows of shrubs and smaller trees on the windward edge. Then thin and underplant the old belt, using shade bearing conifer nurse trees such as western hemlock.

7. Fencing.

Keep stock out with a new stockproof fence at least three metres from the first row. If the fence is rabbit proof, then individual guards will not be required.

8. Maintenance and initial weeding.

Weed for half a metre radius around each tree for the first three years. Use glysophate initially for grass control and then add broadshot or a similar product designed to control broadleaved weeds such as thistles, docks and nettles. Wind stream dynamics

The theory of the sheltered area is simple to understand. High wind speed means high rates of transfer of wind energy, heat, water vapour and noise. This is sometimes called the ‘wind chill factor’ and the faster the wind, usually the greater the chill.

The well designed shelterbelt deflects the majority of the fast and therefore colder wind upwards, while its 50% porosity allows adequate airflow of the slower and therefore warmer wind. In turn this holds up the faster cold wind, racing over above it. In effect it becomes rather like two plates of wind, the lower plate supporting the upper plate. The warmer, more humid air below tree level is not rapidly mixed with the colder, drier air in the main windstream. Wind turbulence, normally associated with solid, dense structures is also avoided.

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How much shelter will result

As a rough rule, and with winds at the right angle to the belt, a significant microclimate will extend about 20 tree heights into the field behind. The longer the shelterbelt, the better the result. Thus the microclimate effect arising from a mature 10 metre high shelterbelt extends 200 metres beyond it. Several acres of land (up to 9 acres) will be dramatically transformed and its productive and conservation value enhanced.
Two hundred metres can provide precious additional output to stock and crops. This may mean earlier lambing, less input of food for increased live weight gain in cattle, shelter for horses, better crop yields, and reduced physical damage to crops by wind or windblown soil. Even a single row of grey alder can be effective and is the traditional method used by fruit farmers to diminish the potential damage of spring frosts.

Climate change

Extreme weather events, more intensive rainfall and long periods of drought look likely to become the regular pattern of seasonal activity. This makes the benefits arising from shelterbelts and microclimates an ever more essential part of a landowner’s need to capture better productivity, reduce waste and develop an improved carbon footprint.