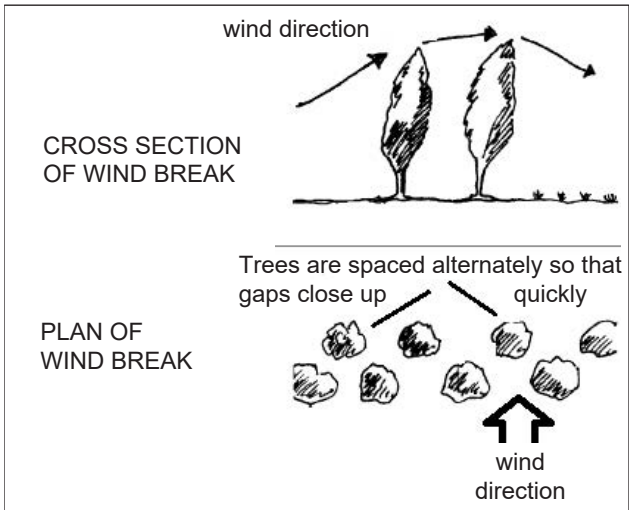
Windbreaks

If you farm land where the soil is dry, have you noticed the soil blowing around your fields? Are your crops stunted? Have they stopped growing? Do you have to sow several times because the seeds are buried or blown away? You are not alone. Many farmers throughout Africa and the world are having the same problem. Over time, wind can blow much soil away. Crop yields then decline. Some farmers have already taken steps to protect their soils by growing trees to slow down the wind. In this Action Sheet, we'll describe how they do this.

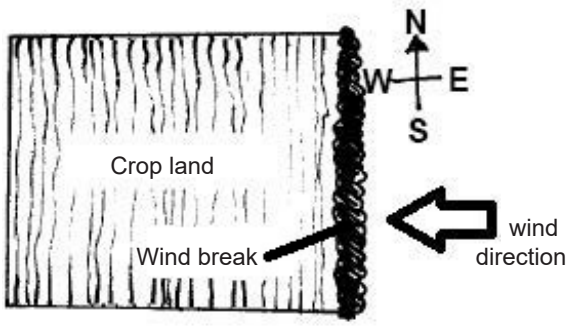


A windbreak design used in hot dry places

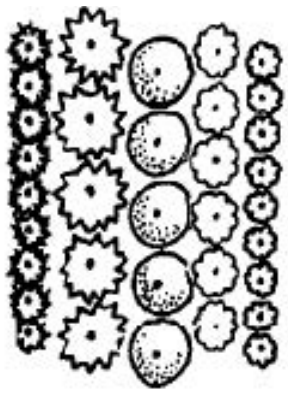
What is a windbreak?

Sometimes called a shelterbelt, a windbreak is a barrier of trees and shrubs that help to slow down the speed of wind. Sometimes farmers plant lines of trees just on their own land. These may serve as windbreaks as well as field boundaries. In other cases, windbreaks are planted to protect the soils and crops on several farms.

If the wind blows from east to west, then you should plant the windbreak from north to south, on the eastern side of the land.



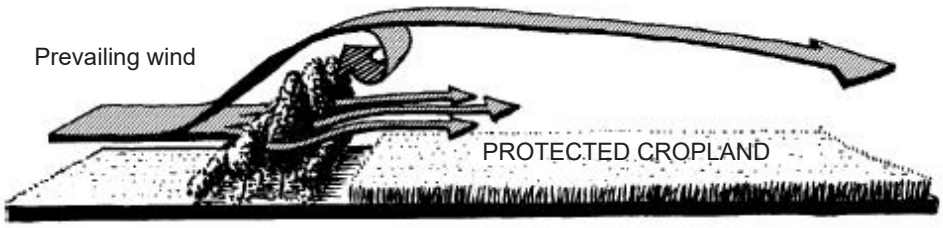
PLAN OF WIND BREAK



PLAN OF WIND BREAK

CROSS SECTION OF WIND BREAK

A well designed windbreak
The pre ailing wind is slowed down at ground le el, but wind is still able to pass through the trees. Stronger air currents stay high abo e the trees. Source: Rocheleau et al., . Diagram from I RAF



A poorly designed windbreak
If wind is blocked completely, it will cause strong air currents o er the land that should be protected. These can damage crops and promote erosion. If there are gaps in rows of trees, the wind is funnelled through them at higher speeds, resulting in more soil erosion. Source: Rocheleau et al.,

Do windbreaks help increase crop yields?
Well-designed windbreaks certainly do slow down wind. This helps soil retain water, and reduces damage to plants. But it's very hard to measure how much windbreaks contribute to increases in crop yields. One problem is the difficulty of being able to measure the effect of windbreaks on crop yields. When yields in a field protected by a windbreak are compared with those on an unprotected field, the unprotected field might have to be a long way away to make sure it is not affected by the windbreak. But then it might have different soil and water conditions. Another thing that has to be taken into account when calculating crop yields is the loss of cropland taken up by the windbreak itself. Yields may also suffer a little from the competition for water and light between windbreak trees and crops.

Are you saying windbreaks may not increase crop yields?
In general, it is believed that well-designed windbreaks do increase crop yields, but the effect of windbreaks on crop yields does vary considerably. In some cases, grain yields have increased significantly. In other cases, crop yields may have been reduced slightly. The effect on yield does depend upon the design of windbreaks, the crops involved and the environment.

So if there's no certainty that windbreaks will increase crop yields, why should people think about growing them?
There are two big benefits — long-term soil protection and products that can come from windbreak trees themselves. Tree products may be useful to farmers and provide extra income.

What sorts of products?
Fuelwood and poles are two valuable products. Take the Majjia Valley in Niger, for example. Strong winds were causing crop damage and soil erosion, so windbreaks of Azadirachta indica were planted. It has turned out that gains in crop yields have been relatively modest and quite variable. But, the returns from harvesting windbreak trees for fuelwood and especially poles have been more important than gains in crop yields. Of course, wood cannot be harvested until several years after planting.

Do people grow some windbreak trees for other products?
Yes. Cashew trees in a windbreak in Senegal are producing fruits and nuts, not enough to sell on large-scale, but nevertheless, they are an important addition to local diets. Where people grow Prosopis species, the trees' yield of seed pods are collected to supplement animal feed, and are sold in local markets. Sometimes windbreak trees may be helpful to local industries, too. Acacia scorpioides trees planted in windbreaks in Niger are now producing seed pods used for traditional leather tanning.

Multi-purpose trees for windbreak and shelterbelts

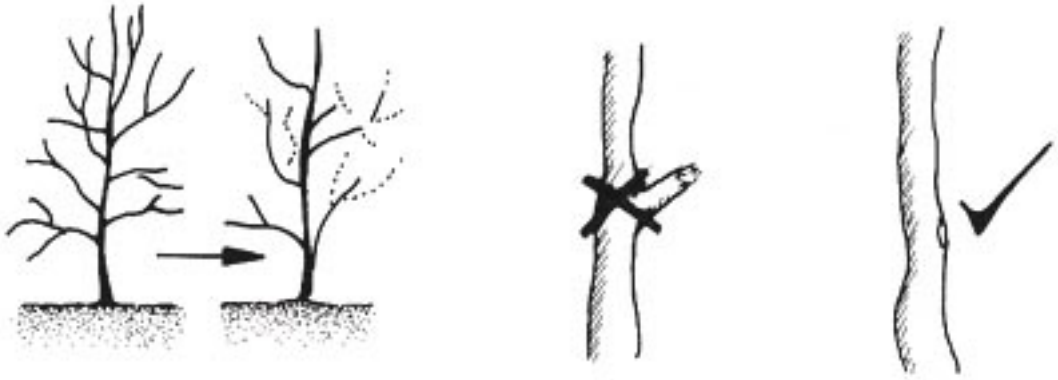
Species grown for this purpose should:
- tolerate harsh environments;
- have a bushy, deep crown but that still allows some wind penetration;
- keep lower limbs for a long time;
- have strong roots;
- grow quickly;
- live long;
- tolerate pests and diseases;
- not harbour pests that affect nearby crops;
- not have roots that compete excessively with nearby crops for water and nutrients.

SOURCE: Forestry/Fuelwood Research and Development Project, 1992. Growing Multipurpose Trees on Small Farms. Bangkok, Thailand. Winrock International.

Pest and disease control
Fruit-trees are best prepared to fight pests and diseases when they are planted in conditions that suit them. These conditions include optimum sunlight or shade, shelter, drainage and soil type. Many problems can be avoided if good hygiene is practised: plant only healthy trees, remove and compost fallen or diseased fruit, prune dead branches and do not bring soil from around infected plants into the garden. For more information, read Action Sheet 33: Natural Pest and Disease Control.

Tree Husbandry
Like other plants and animals, fruit-trees will grow and produce better if they receive proper care.

Pruning. Some trees, such as citrus and mango, benefit from tree shaping. At planting, select the strongest upright branch of the seedling to become the future trunk of the tree. As the tree grows, carefully prune branches that are too close or rubbing together. This allows air and light to circulate through the tree, reduces diseases and can improve fruiting. Prune weak branches and those that let fruit hang too close to the ground where animals or soil diseases can attack them. Remove dead branches, where pests may be living. The cut surfaces can be covered with wood ash to seal the damaged tissues.



Feeding. Trees benefit from the application of compost or fertilizer, particularly at planting. Generally, 2 kg of good compost or a small handful of NPK fertilizer should be applied at planting, and then again every four months. Apply compost or fertilizer before (not during) tree flowering and again when the tree's fruit is half-mature. Put organic matter or mulch under a tree to provide nutrients, reduce weed competition and retain soil moisture.

Watering. Young fruit-trees are sensitive to drought and need daily watering during the dry season for the first year or two. Older trees are more resistant and may not need supplementary watering. Fruit-trees such as papaya benefit from daily watering throughout their lives. Not all trees, however, need supplementary water.

Some suggested trees: fruits, nuts and spices

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Acknowledgements

This Action Sheet is an edited version of FAO Home Garden Technology Leaflet 14. http://www.fao.org/docrep/003/x3996e/x3996e38.htm

More information

FAO: www.fao.org

Food and Trees for Africa: www.trees.org.za

Practical Action Technical Briefs on Food Processing have lots of ideas about ways to prepare fruit and nuts for preservation or sale: https://answers.practicalaction.org/our-resources

To learn more about PACE please view our website www.paceproect.net, e-mail pace@tusk.org or write to PACE, Tusk Trust Ltd, 4 Cheapside House, High Street, Gillingham, Dorset, SP8 4AA, UK. Tusk Trust Limited is a Charity registered with the Charity Commission for England & Wales (charity number 1186533) and a Company registered in England and Wales (company number 11948023) | (Formerly Tusk Trust, charity no. 803118).