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PLANTING WINDBREAKS IN CEYLON

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PERIODICITY OF WINDS

IN Ceylon, winds are seasonal and correspond to the south-west and north-east monsoons. The former commences in May and lasts till September while the latter influences the Island from October to January. The directions of the prevailing winds are mainly south-west and north-east respectively. February and March are the calmest months all over the Island. The south-west winds over the Island are stronger and wind velocities over 50 miles per hour are not unusual during this period. The moisture laden south-westerly winds having deposited their moisture in the south-western region and the central hills blow across the eastern slopes of the central mountain massif and the planes in the North, North-Central, North-Western, Uva and Eastern Provinces as drying winds. During this period, these areas receive very little rain or no rain at all and drought conditions prevail for 5-6 months of the year. Under such conditions, the vegetation is subjected to severe desiccation more especially in the arid regions of Hambantota and Mannar.

EFFECT OF WIND ON VEGETATION

Desiccation. Evaporation increases when the air is in motion and this is so even when the saturation deficit is zero. When plants transpire, humid air accumulates around plant surfaces. Wind removes such humid air from the transpiring surfaces causing plants to transpire more. Plants living in wind-swept areas develop xeromorphic characters to reduce transpiration and desiccation.

Dwarfing. One of the most characteristic features of plants growing in dry wind-swept areas is their dwarfing. This is seen in plants growing in exposed hill tops in the Montane Zone and the arid lowlands in the Hambantota and Mannar districts. Dwarfing with increased altitude is observed at Pidurutalagala (8,281 ft.), Adam's

Peak (7,360 ft.) and Hakgala Rock (7,000 ft.). The low growing thorn-scrub common in the arid areas of the Island is the result of constant exposure to dry conditions coupled with desiccating winds. Plants growing under such extremes fail to reach a degree of turgidity, and as a result their organs are dwarfed.

Deformation. In windy areas, tall trees are deformed in various ways. At the Botanic Gardens, Hakgala, situated 5,500 ft. above sea level, the conifers have asymmetrical crowns with the branches permanently bent from the windward side and point in a leeward direction.

Uprooting and breakage. Trees with shallow root systems are susceptible to uprooting, and brittle branches are liable to breakage during severe gales. The writer has observed severe damage to trees, shrubs and herbs at the Hakgala Gardens by breakage of their branches, twigs and leaves during the windy season.

Salt spray near coastal areas. Particles of salt carried by wind are injurious to delicate plants growing near the immediate vicinity of the sea. Species naturally growing near the sea are tolerant to salt spray and they can be used for planting windbreaks to render protection to non-salt tolerant useful and ornamental plants.

WINDBREAKS

A windbreak is defined as a densely planted belt of tall vegetation placed at right angles to the direction of the prevailing winds to reduce the velocity of wind near the ground. The width of the belt may be between 50 and 200 feet. For maximum benefits, these belts should have the tallest trees at the centre flanked by shorter trees and shrubs planted in a descending order of height from the centre. Theoretically, the effect of such a mass of vegetation is said to extend to a distance equal to 100 times the height of the trees in a leeward direction (1). In actual practice, satisfactory protection is provided only to a distance equal to about 25 heights. For continuous protection extended over a wide area, windbreaks should be planted about 25-50 heights apart.

PURPOSE OF WINDBREAKS

Prevention of loss of soil moisture. This is the most important beneficial effect of windbreaks especially in the dry and arid zones of the Island. The planes in the above climatic zones of the Island are swept by drying winds from May to about September and the

loss of moisture as a result of evaporation and transpiration is considerable. Planting windbreaks reduces such losses of moisture resulting in a more efficient use of soil moisture by crops. In the hills of the Central Province and the undulating country of the Uva Valley, considerable stretches of land are under vegetable cultivation. Vegetable crops need protection from the severe gales experienced during the south-west monsoon period and windbreaks planted at suitable distances facilitate the crops to utilise the available moisture efficiently and also prevent desiccation. In the Dry Zone when virgin forest is cleared for cultivation of crops, it is desirable to leave narrow strips of forest to serve as windbreaks. This will eliminate extra expenditure if windbreaks are found necessary later when the entire area has been cleared.

Protection for buildings and dwellings. Windbreaks planted close to buildings and dwellings in wind-swept areas prevent damage to property, man and animals. Windbreaks also serve as dust screens in such areas. In the hills, windbreaks prevent cold winds blowing into dwellings thus saving in the heating of houses.

Prevention of damage to crops by uprooting and breakage. Windbreaks reduce the velocity of wind and prevent uprooting of crop plants and breakage of their branches, flowers and fruits.

Prevent salt spray near the sea. Windbreaks consisting of salt tolerant species planted at right angles to the direction of salt spray prevent injury to crop and ornamental plants in coastal areas.

Supply of timber and fuel. Every effort must be made to select plants suitable for timber and fuel for planting in a windbreak. Such a windbreak is a dual purpose one giving protection to crop plants on one hand, and serving as a source of timber and fuel on the other.

DISADVANTAGES OF WINDBREAKS

Depletion of moisture and nutrients in the soil. This is one of the major drawbacks of windbreaks. Depletion becomes greater if wide as well as densely spaced windbreaks are established.

Shade on crops. Windbreaks cast shade in the vicinity resulting in a reduction of the total crop area.

Root competition. Roots from windbreak trees may spread out and compete with the crop plants for nourishment. This can be prevented by (a) growing deep rooted trees, (b) avoiding species propagating

by suckers, (c) preventing surface rooting by deep cultivation, and (d) planting windbreaks as narrow as possible and spaced as far as feasible to obtain maximum benefits.

QUALITIES OF TREES FOR WINDBREAKS

TREES for windbreaks should possess the following characteristics :—

Spreading habit. An ideal windbreak tree should possess a crown of a spreading habit so that when such a tree is planted in a windbreak a dense continuous mass of vegetation is obtained without gaps. Trees with tall, columnar crowns are not suitable for windbreaks.

Evergreen trees. Deciduous trees should not be selected for windbreaks as they are not capable of retarding the velocity of wind during the time of leaf fall.

Withstand bending strains. Windbreak trees should be strong with sound mechanical construction to resist bending strains without breakage. Trees with brittle branches should be avoided.

Deep rooting. Deep rooted trees are advantageous in two ways. Firstly, such trees are firmly anchored to the ground so that they are not blown down by wind easily and secondly root competition is minimised to a great extent. Most annual crops are shallow rooted and depend on the surface soil for their moisture and mineral nutrients.

Natural regeneration. Trees with natural regeneration either by seeds or vegetative methods are preferred for windbreaks, as such trees will maintain the windbreak in good condition throughout without much effort.

PLANTING WINDBREAKS

PLANTING windbreaks should be carried out during the rainy season. In the hills, this can be done during both the south-west and the north-east monsoons, while in the Dry Zone advantage should be taken of the north-east monsoon.

Lining, holing and planting. Having selected the location and suitable planting material, lining and holing should commence before the onset of the rains. Large trees should be planted about 40-50 feet apart while small trees should be spaced about 25-35 feet apart. Holing should be alternate so that maximum cover is obtained. Holes should be about 2-2½ ft. in diameter and 2-2½ ft. in depth. It is desirable to incorporate a basket full of cattle manure or compost to the

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top soil of each hole. The tall growing species should be planted in the centre of the strip while the shorter trees and shrubs should flank the tall trees in a descending order of height from the centre. In the hills, the soil should be raised around the plants to avoid water stagnating around while in the dry and arid areas it is desirable to plant deeply with a depression round the plant to retain moisture.

SELECTIONS OF SUITABLE TREES FOR WINDBREAKS

Arid and Dry Zones

TALL TREES

<i>Botanical Name</i>	<i>Sinhala, Tamil and English Names</i>
Albizzia lebbek	Mara, S. ; Vahai, T.
A. odoratissima	Suriya-mara, S. ; Ponnaimurankai, T. ;
†Azadiracta indica	Kohomba, S. ; Vempu T. ; Margosa, E.
Berrya cordifolia	Halmilla, S. ; Chavandalai, T. ; Trincomalee-wood, E.
Caesalpinia coriaria	Divi-divi, E.
Cassia siamea	Wa, S. ; Vakai, T.
†Casuarina equisetifolia	Kasa-gaha, S.
Chloroxylon swietenia	Burutha, S. ; Mutirai, T. ; Satin-wood, E.
Delonix regia	Flamboyante, E.
Eucalyptus alba	White Gum, E.
E. citridora	Lemon Scented Gum, E.
Euphoria longana	Mora, S. ; Nurai, T.
Ficus benjamina	Java Willow, E.
*Lagerstroemia speciosa	Murutha, S. ; Queen Flower, E.
†Millingtonia hortensis	Indian Cork Tree E.
†Mischodon zeylanicus	Tammanna, S. ; Tampanai, T.
Peltophorum pterocarpum (Syn.: P. inerme)	Ivalvagai, T.
Pterocarpus indicus	Gammalu, S. ; Padouk, E.
†Samanea saman (Syn.: Pithecolobium Saman)	Mara, S. ; Penikaral, T. ; Inga Saman, E.
Schleichera oleosa	Kon, S. ; Puvu, T.
Swietenia macrophylla	Large Leaved Mahogany, E.
S. mahogany	Small Leaved Mahogany, E.
†Tamarindus indica	Siyambala, S. ; Puli, T. ; Tamarind, E.
Tectona grandis	Tekka, S. ; Teak, E.
Tabebuia rosea	—
*Terminalia arjuna	Kumbuk, S. ; Marutu, T.
T. bellerica	Bulu S. ; Ranimaran, T.
T. chebula	Aralu, S. ; Kadukkai, T.

<i>Botanical Name</i>	<i>Sinhala, Tamil and English Names</i>
Vitex leucoxydon	Ne-bedda, S.; Kaddunochchi, T.
V. pinnata	Milla, S.; Kadamanakku, T.
MEDIUM TREES AND SHRUBS	
Acacia leucophloea	Katu-andara, S.; Velvel, T.
Atlantia missionis	Pamburu, S.; Kuruntu, T.
†Barringtonia asiatica	Mudilla, S.
†B. racemosa	Diya-midella, S.; Samutharam, T.
Bauhinia racemosa	Maila, S.; Atti, T.
†B. tomentosa	Kaha-petan, S.; Tiruvathi, T.
Butea monosperma	Gaskela, S.; Parasu, T.; Flame of the Forest E.
†Calotropis gigantea	Wara, S.; Manakkovi, T.
Carissa carandas	Maha-karanda, S.; Perunkila, T.
Cassia auriculata	Ranavara, S.; Avarai, T.
C. fistula	Ehela, S.; Tirukkantai, T.; Indian Laburnum, E.
C. roxbourghii	Ratu-wa, S.; Vakai, T.
Diospyros ebenum	Kaluwara, S.; Karunkali, T.
D. embryopteris	Timbiri, S.; Panichchai, T.
D. ovalifolia	Habara, S.; Veddukkanni, T.
†Heritiera littoralis	Etuna S.; Chomountiri, T.
Jacaranda mimosifolia	Jacaranda, E.
Lawsonia inermis	Henna, S.
Leucaena glauca	—
Mimusops elengi	Munamal, S.; Mukalai, T.
Morinda tinctoria	Ahu, S.; Manachavanna, T.
Murraya paniculata	Etteriya, S.
†Ochrosia borbonica	Madu-kaduru, S.
†Pandanus tectorius	Madu-keiya, S.; Talai, T.
Parkinsonia aculeata	Mulvakai, T.
†Pisonia grandis	Wata-banga, S.; Lechai-kotta, T.
(Syn: P. alba)	
Pithecellobium dulce	Andara, S.; Madras Thorn, E.
Polyalthia longifolia	Mara-illupai, T.
Prema latifolia	Maha-midi, S.; Pachumullai, T.
P. serratifolia	Midi, S.; Eramaimullai T.
†Salvadora persica	Uvay, T.
†Scaevola sericea	Takkada, S.
Tabebuia serratifolia	—
Tecoma stans	—
†Thespesia populnea	Suriya, S.; Kavarachu, T.; Tulip Tree, E.
Thevetia nereifolia	Yellow Oleander, E.
zizyphus jujuba	Maha-debara, S.; Iantai, T.

† Specially suited to the sea-coast.

* Suitable for planting near water.

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HILL COUNTRY

TALL TREES

<i>Botanical Name</i>	<i>Sinhala, Tamil and English Names</i>
<i>Araucaria bidwillii</i>	Monkey-Puzzle, E.
<i>A. cookii</i>	Cook's pine.
<i>Calophyllum walkeri</i>	Kina, S.
<i>Casuarina equisetifolia</i>	Kasa-gaha, S.
<i>C. montana</i>	—
<i>Cedrela serrulata</i>	Red Toon, E.
<i>C. toona</i>	Toon tree, E.
<i>Cupressus knightiana</i>	—
<i>C. macrocarpa</i>	Monterey Cypress, E.
<i>C. torulosa</i>	Himalayan Cypress, E.
<i>Eucalyptus citridora</i>	Lemon Scented Gum, E.
<i>E. globulus</i> and other species	Blue Gum, T.
<i>Michelia nilagirica</i>	Wal-sapu, S.
<i>Pinus longifolia</i>	Pine tree E.
<i>P. montezumae</i> and other species	Pine tree, E.
<i>Syncarpia glomulifera</i>	Turpentine tree, E.
<i>Tristania conferta</i>	Queensland Boxwood, E.

MEDIUM TREES

<i>Acacia dealbata</i>	Silver Wattle, E.
<i>A. decurrens</i>	Black Wattle, E.
<i>A. melanoxylon</i>	Black-wood, E.
<i>Bucklandia populifolia</i>	—
<i>Castanospermum australe</i>	Moreton Bay Chesnut, E.
<i>Cinnamomum camphora</i>	Kapuru, S.
<i>Cryptomeria japonica</i>	Japanese Cedar, E.
<i>Cupressus funebris</i>	Weeping Cypress, E.
<i>Grevillea robusta</i>	Silky Oak, E.
<i>Juniperus bermudiana</i>	Bermuda Cedar, E.
<i>Melaleuca leucadendron</i>	Lok-sumbul, S. ; Cajeput Tree, E.

REFERENCES

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