Discussion Paper

Soil Interpretations for Forestry

1983

WINDTHROW HAZARD

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WINDTHROW

This paper provides a very brief overview of background information on windthrow factors which are considered to impact the forest. Because of lack of information, the degrees of soil limitations are not developed for each item affecting forest use.

Windthrow Limiting Factors

The susceptibility of the forest to windthrow hazards is caused by a number of combined factors. These factors are meteorological, physiographic, edaphic, biological, and management practices.

1. Meteorological factors:
    a) Wind - direction, speed, and frequency.
    b) Precipitation - including quantity, intensity, glaze, and snow.
2. Physiographic factors:
    a) Physical location; exposure and aspect.
    b) Topographical features of knolls, ridges, narrow valleys, and hummocky microrelief.
    c) Slope.
3. Edaphic factors:
    a) Impedance of root development - by shallowness, stream gravel, cemented layers, compacted layers, clay, fine textured soil, poor drainage, and high water table.
4. Biological factors:
    a) Stand composition, root rot, butt rot, poor stocking, open stocking, tree species and rooting characteristics.
5. Management practices:
    a) Forest practices such as selective versus clear cutting; size, shape, and orientation of cutting; cutting patterns, including thinning, leave strips, borders, seed trees; time since cutting; and fire management.

The quantitative relationships of each of the 5 limiting factors listed above are unknown, but the literature reviewed indicates that the physiographic and edaphic factors are sufficiently important to be considered when developing national guides for assessing soil limitations for windthrow hazard. Furthermore, the required physiographic and soil information may be extracted from most soil surveys. Table 1 suggests the main items to consider when developing windthrow hazard ratings from existing soil data. Research may be needed to establish meaningful degrees of physiographic and soil limitations for each item suggested.

Table 1 is tentative. The first task in developing guides for assessing windthrow factors is to select the items affecting forest land use. There may be other items in addition to the suggested factors above (meteorological, physiographic, edaphic, biological, and management practices). Some items can be directly related to existing data; e.g. soil texture. Others will require research before soil characteristics can be related to the interpretation being developed; e.g. physiographic, biological and management practices. The need for the research is evident by the underdeveloped state of Table 1. It is recommended that provincial forestry agencies be contacted to establish the extent of the windthrow problem, and from the information received a research project be established in a high priority area, the goal being to develop a better interpretive methodology for windthrow hazard, using existing data and identifying new data to be collected.

Table 1. Guide for assessing physiographic and soil limitations for windthrow hazards

Item affecting use	Degrees of limitation		
	None to slight	Moderate	Severe
Physiographic factor:			
Exposure	Lee side (eastern), transverse valley, valley bottom.		Windward side, open slopes, narrow valley, valley linear with wind.
Aspect	Eastern		SW, W, NW.
Topographic class	Level to gentle 0 - 9%	Moderate to strong 10 - 30%	Very strong to very steep; 31 - 100%
Elevation	Low		High
Funneling	Broad, open space		Restricted space, funnel features.
Shape	Regular, subdued	Irregular, abrupt	Cols, cirques, passes
Mass	Long chain, subdued		Isolated peak, abrupt
Mountain location	Valley floor, benchland	Valley wall	Peak
Plains location	Depressional	Rolling	Hills, knolls, ridges
Edaphic factors:			
Depth to root restricting layer	1 - >3m	50 - 100 cm	<50 cm
Soil texture	l,sil,sl,s,ls	sicl,scl,sc	cl,sic,c
Drainage	Rapid to moderately well drained	Imperfectly drained	Poorly to very poorly drained.
Depth to water table	1 - >3m	50 - 100cm	<50cm

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