Trees: Body language, Diagnosis, Biomechanics- an open door to a wonderful world!

C. Mattheck, K. Bethge, K. Weber

KIT Karlsruhe Institute of Technology

Institute for Applied Materials

P.O. Box 3640

D- 76021 Karlsruhe

Germany

Introduction:

This little collection of posters cannot replace intense reading or studies on the subject.

It is intended to wet your lips, to look into the YouTube- videos and the books, to get that deeper understanding what you should have, when you are responsible for trees, protect trees or just love trees!!

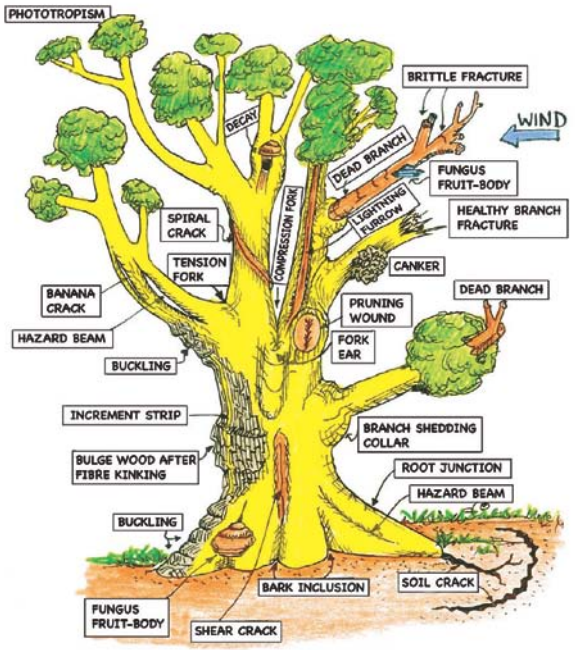
There is no complex mathematics involved, it is a mixture of universe geometric shapes of nature verified in field studies and by nature observation.

Our tree diagnosis method VTA (Visual Tree Assessment) is used worldwide.

Karlsruhe Institute of Technology

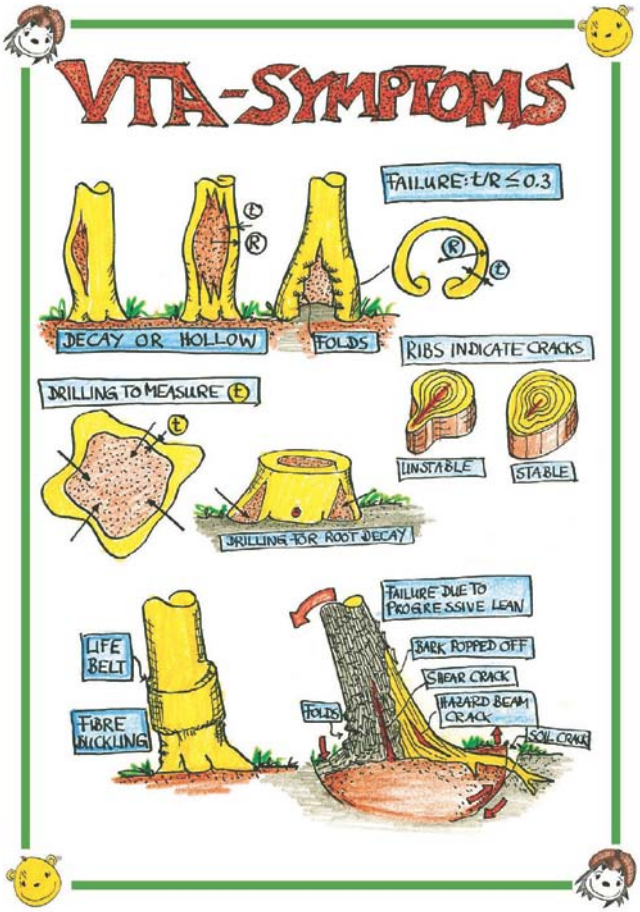
A First Glance at VTA

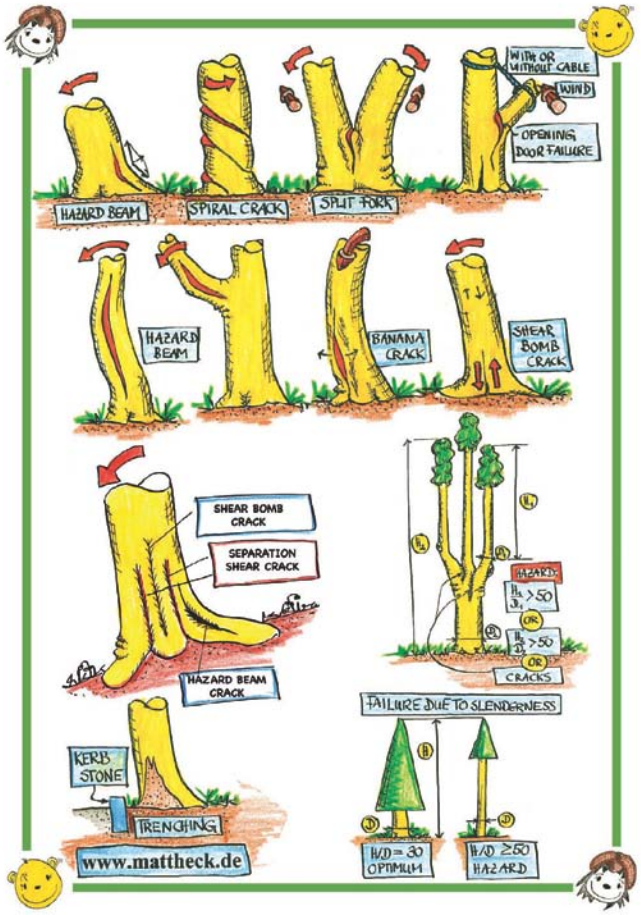
Prof. Dr. C. Mattheck, Dr. K. Bethge, Dr. K. Weber



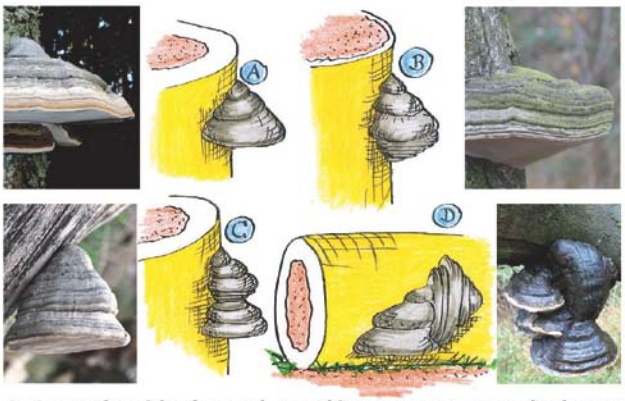
KIT – University of the State of Baden-Wuerttemberg and
National Research Center of the Helmholtz Association

www.kit.edu





The body language of fungus fruit-bodies



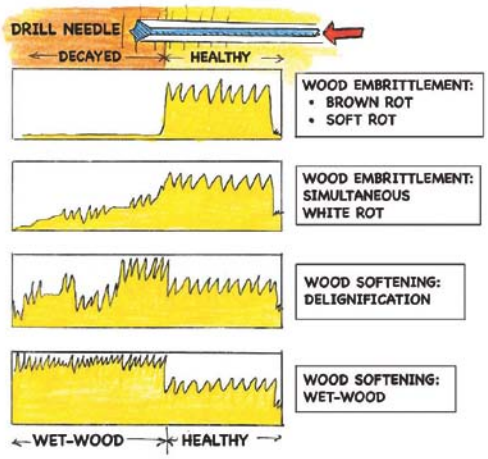
A: Lots of residual wood, good increments up to the latest growth "thrust", i.e. up to the present. (Caution: the tree may fail despite this.)

B: Previously plenty of wood as nourishment, but now hardly any residual wood left, therefore hardly any more increments in the fruit-body.

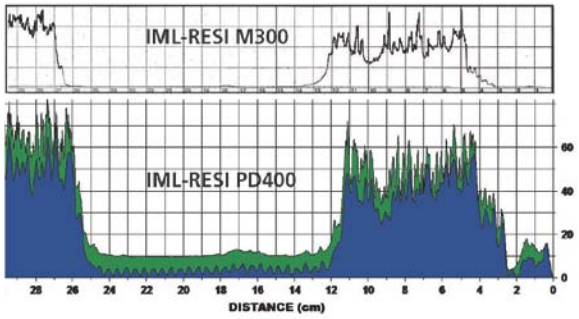
C: Plenty of wood accessible at first, then less and less. Breaking through a decay compartmentalization zone makes more wood accessible again.

D: Good decay compartmentalization before the tree fails. All the accessible residual wood has been consumed. When the tree falls the compartmentalization is broken through: new wood available as nourishment, new fruit-body increment.

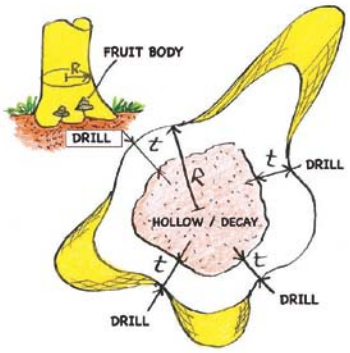
Drill resistance measurement



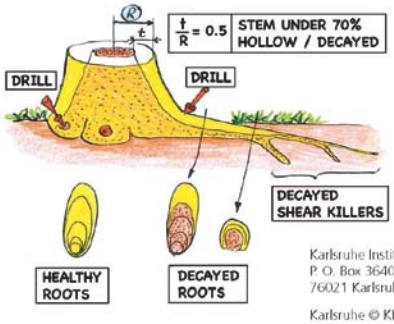
(EXAMPLES OF TRACES, WHICH MAY VARY!)



Residual wall thickness at the stem base



Tree dangerous despite safe stem



Karlsruhe Institute of Technology (KIT)
P. O. Box 3640
76021 Karlsruhe, Germany

www.mattheck.de

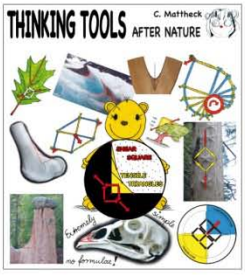
www.iam.kit.edu

Karlsruhe Institute of Technology

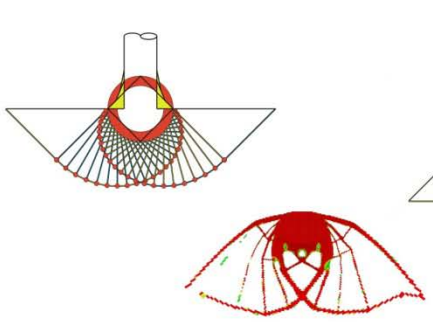
Institute for Applied Materials
Hermann-von-Helmholtz-Platz 1
D- 76344 Eggenstein-Leopoldshafen
Germany
www.kit.edu

Root Mechanics Based on „Thinking Tools after Nature“

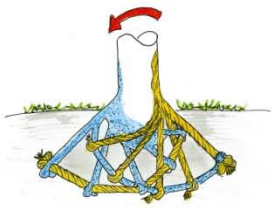
C. Mattheck, K. Bethge



Root Plate of Single Tree



SKO (Soft Kill Option)

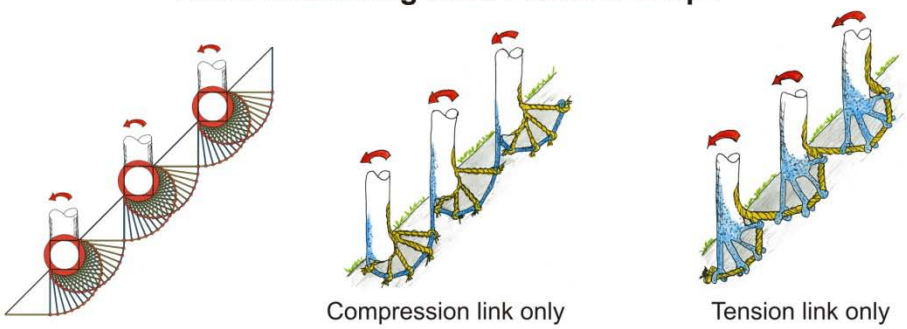


Two Interacting Root Plates

Compression link only

Tension link only

Three Interacting Root Plates at Slope



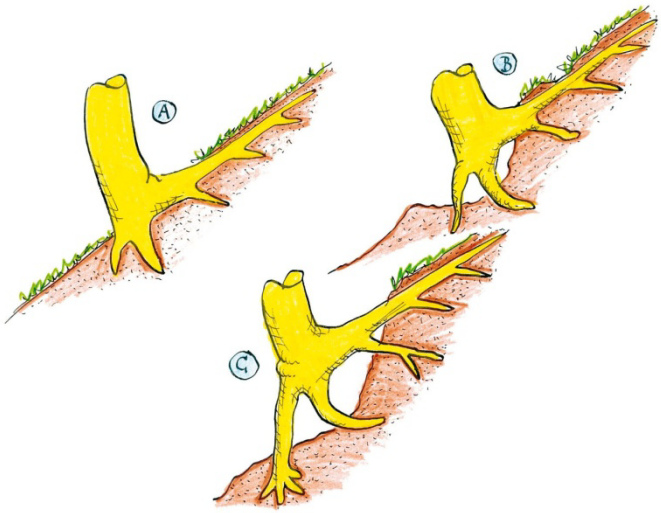
Compression link only

Tension link only

The pictures show force flux! Safe trees anchor in this way!

02.05.2011

Assessing trees on slopes



As a result of wind sway movement, trees on slopes (A) loosen the soil and undermine themselves (B). This can only be compensated if a supporting root is formed downslope, which has enough time to grow in diameter without kinking or buckling (C). If this is the case, one must always look out for soil cracks, root tear-out or root rupture on the upslope side. Shrubs, herbaceous plants or "biological steel netting" (ivy!) are better than trees for stabilising slopes.

42

Self-undermining starting, and thickening of the supporting root already obvious. Are there soil cracks upslope above the tension roots?

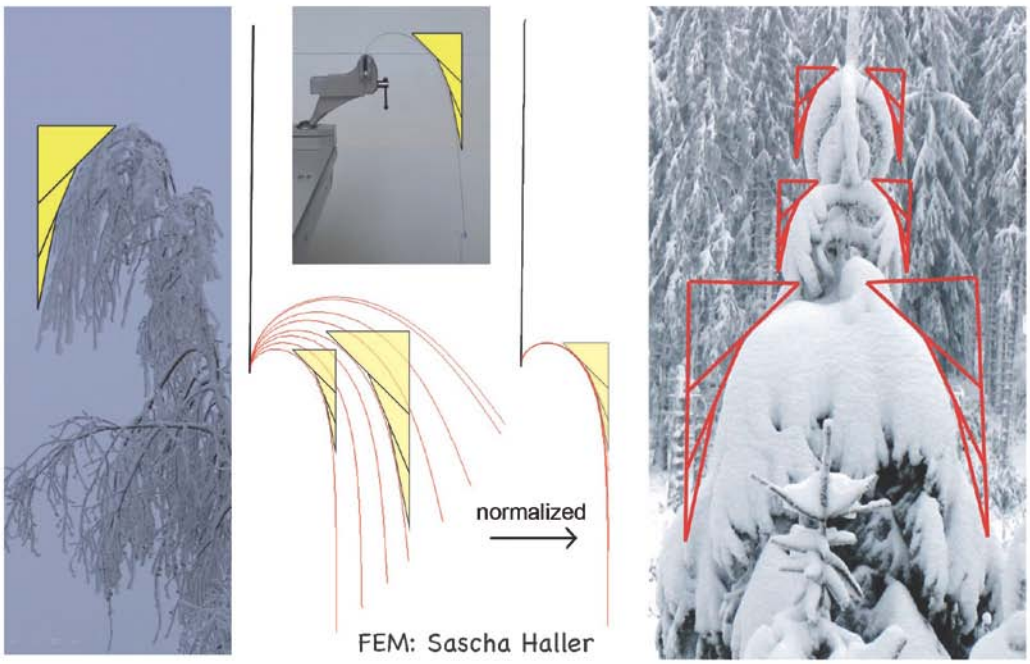
Self-undermining completed, and a successful support root as an extension of the stem. The tension roots upslope should not tear out!

No support root whatsoever, and therefore a bad prognosis as the self-undermining progresses.

43

From: C. Mattheck, Updated Field Guide for Visual Tree Assessment, 2007

Optimization by deformation



A bending beam, such as a steel ruler, assumes a shape which reduces the horizontal bending lever. Weeping willows, or trees under snow loads, benefit from this technique, especially as the tension triangles contour appearing in these cases also helps against more snow or rain through lower fluid mechanical resistance. Also brook pebbles have shapes advantageous in terms of fluid mechanics, provided they were surrounded by water for a sufficiently long time: a convex tree fork.

232

From: C. Mattheck, Thinking Tools after Nature, 2011

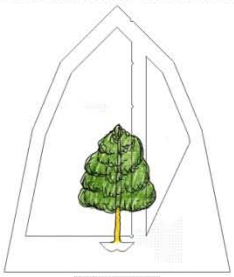
Karlsruhe Institute of Technology

Institute for Applied Materials
Hermann-von-Helmholtz-Platz 1
D- 76344 Eggenstein-Leopoldshafen
Germany
www.kit.edu

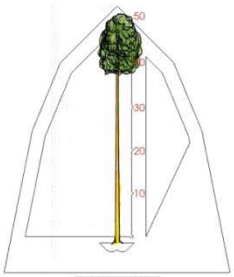
A new multi-purpose tool for tree diagnosis

C. Mattheck, K. Bethge

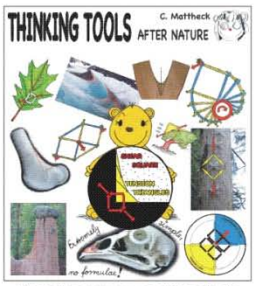
1. Slenderness measurement



H/D = 25



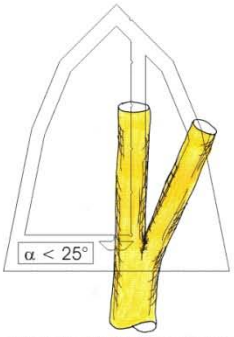
H/D = 50



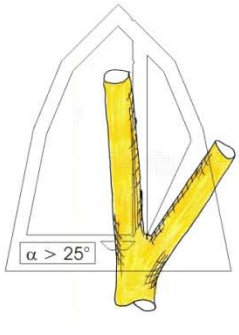
Literature: www.mattheck.de

Keep the tool in such a way, that a tree stem just above the buttress fits well in between the 3mm gap. Read the H/D-ratio at the notches (Mattheck, C., Updated field guide for visual tree assessment).

2. Bark inclusion at tree forks

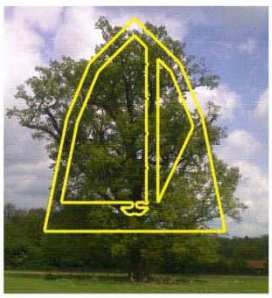


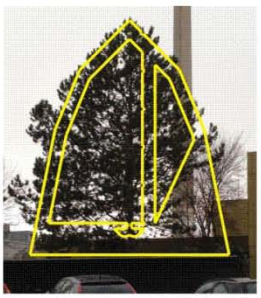
normally with included bark



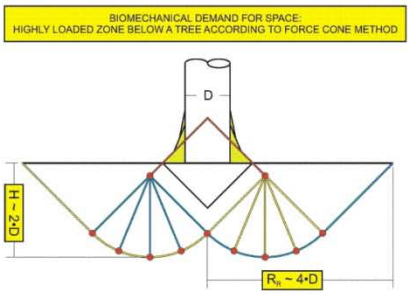
nomally no included bark

3. Pruning options - no dogma!





4. First assessment of windthrow and highly loaded zone according to force cone method



Attention: The message of the tool is no dogma. It is only the biomechanical aspect. It is urgent to regard the habitus of the species and the circumstances of the individual tree, the size of the potential pruning wounds, phototropism, etc. Not all trees must look alike!

12.12.2011

Final remarks:

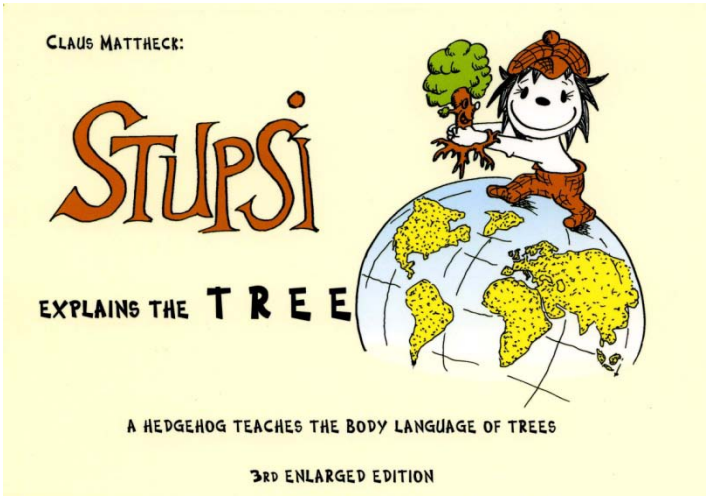
You have seen an extract of our research at Karlsruhe Institute of Technology, which was done to provide a better understanding of trees, a safer diagnosis, to decide and justify arboricultural measures to be done for a longer tree's life and for the prevention from accidents. Altogether: The knowledge should contribute to a better peaceful coexistence of human and trees and safer life of people below trees...

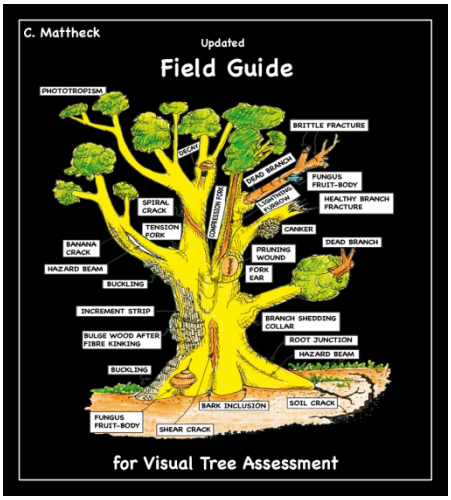
App für iPad: MATTHECK

On my homepage:

www.mattheck.de

you'll find a link to YouTube-videos on these subjects





to purchase from

www.amazon.de

or

www.fabibook.de