4. Results

- Linear regression models depending on species

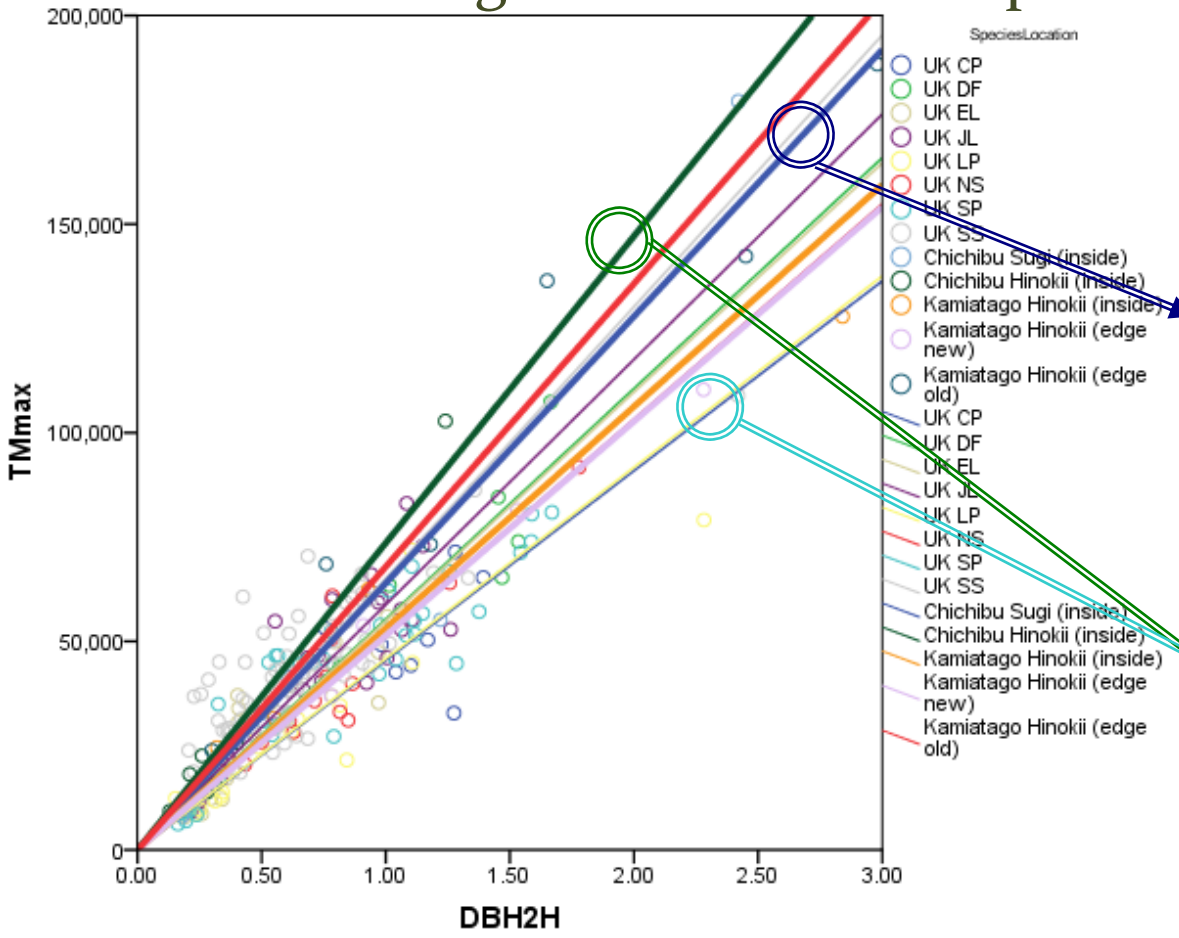

Figure 2: Linear relationship between applied turning moment and DBH2H of overturned sugi, hinoki, and tree species with more than 80 cm of root-soil plate depth in soil type A (mineral soil) in British tree-pulling database.

General Linear Model (GLM) was used to compare models between species.

Eg.1: SS vs. sugi
1 model *Sig.* = 0
2 models *Sig.* = 0.09
- *Models of SS and sugi are preferable to be one model at 0.05 level.*
- *Thus, vulnerabilities against overturning are not statistically different.*

Eg.2: CP vs. hinoki (Chichibu)
1 model *Sig.* = 0
2 models *Sig.* = 0.001
- *It is hard to statistically show that these models are different or not.*
- *More data would be necessary.*

3. Breakage: Demonstrated rupture vs. Real rupture

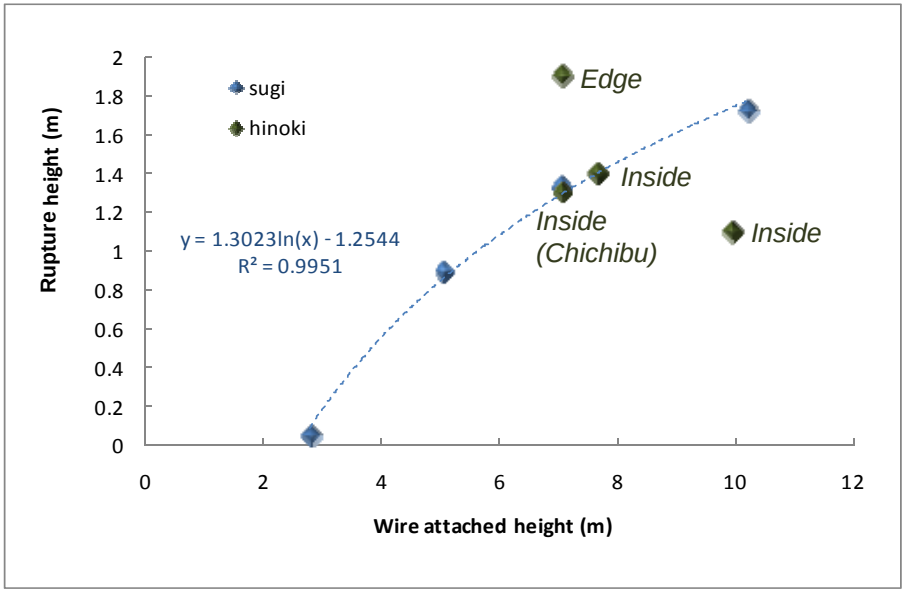

Figure 3: Ruptured sugi and hinoki in the tree-pulling experiments in Chichibu & Kamiatago

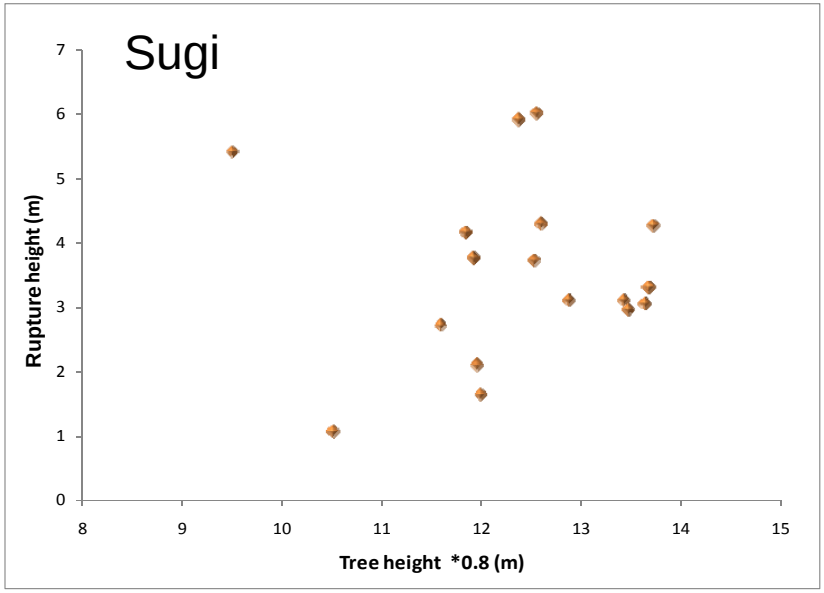

Figure 4: Relationship between rapture height and tree height*0.8 caused by a typhoon in Kyusyu Island in 1991 (Data was provided by Dr. Chiba at FFPRI.)

5. Questions

To improve procedures of tree-pulling experiments,

1. **Overturning**: Although main factors, such as root-soil plate depth and soil type, are similar, various types of stability (dbh^2h against the turning moment) were found.
   - Are other supportive data required?
     - E.g. Measuring water content and stiffness in the soil
2. **Breakage**: Ruptured trees can be used to calculate MOR based on the hypothesis of uniform stress on the stem (Morgan and Cannell, 1994).
   - Can this assumption used for any tree species and conditions?
     - E.g. Trees with very strong stem and root system (eg. hinoki) or on very steep terrain

Conference Information

International conference on

Multipurpose Forest Management

-Strategies for sustainability in a climate change era-

(IUFRO Division 4)

20-25 Sep. 2009, Niigata, Japan

Main sections are:

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- ✓ Silvicultural systems and management planning
- ✓ Disaster damage reduction
- ✓ Carbon sequestration
- ✓ Mathematical modelling
- ✓ Application of remote sensing and geographic information
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