Topics for Master- Thesis

Research Area I: Forest Growth and Environment

1) Growth reaction of cherry (*Prunus avium*) and silver fir (*Abies alba*) on summer drought in the foothills of the Black Forest, Schönberg. (Spiecker).

2) Tree-ring structure and phenology: Retrospective analysis of wood anatomical parameters and long-term phenological data at the International Phenological Garden "Liliental" (Kaiserstuhl) (material exists for the tree species *Picea abies, Pinus sylvestris, Robinia pseudoaccaia, Quercus sp., Prunus avium, Betula sp., Populus sp., Tilia sp*.) (Kahle).

3) Effects of *Lymantria dispar* infestation on tree ring structure in different stem heights and in branches of oaks (Spiecker, in collaboration with Forest Research Station Freiburg, FVA).

4) The growth decline of Norway spruce in the Ore Mountains in the 1980s: Phenomenon and potential causes (Spiecker/ Kahle).

5) Drought or frost damage? Development of a tree-ring based differential diagnosis for the retrospective analysis of tree growth stress factors (Kahle).

6) Drought stress at cell level on beech: How do extreme weather conditions affect cell formation on dry and moist stands in Baden-Württemberg? (Mattes).

7) Drought stress at cell level on sessile oak: How do extreme weather conditions affect cell formation on dry and moist stands in Baden-Württemberg? (Mattes).

8) Differences in the intra-annual density profile of beech and sessile oak in drought years along a water budget gradient in the state of Baden-Württemberg (Mattes).

9) Different oak provenances and their response to drought stress: Analysis of a provenance trial in eastern Baden-Württemberg (Mattes).

10) High- resolution dendrometer measurements of cherry on agroforestry research plots near Breisach (Spiecker).

11) Growth reaction of young cherry, ash, oak and sycamore after the drought 2003 (Spiecker).

12) Assessment of the dendroclimatic potential of *Nothofagus fusca* in New Zealand based on inter- and intra-annual tree ring characteristics (Kahle, in cooperation with SCION, Rotorua, NZ).

13) Comparative study of growth reactions of various Douglas fir provenances and Norway spruce on adjacent sites (Spiecker).

14) Site classification and site productivity on selected sites in China (BMBF-project, Spiecker).

15) Reconstruction of the growth development of spruce trees growing on rocks and/or dead wood in the Black Forest: How long does is take for the roots to reach the soil (Kahle).

16) Environmental control of stem hydrology and growth dynamics of European Beech tree compartments (Stangler).

17) Climate-related Xylogenesis of Scots Pine on a dry site in the Rhine-valley (Stangler).

18) Wood formation dynamics in Douglas Fir provenances (Stangler/ Montwe).

19) Seasonal growth dynamics of Norway spruce, silver fir and European Beech in different elevation sites of the Black Forest (Stangler).

Research Area II: Trees as natural resource and carbon storage

1) Effects of release on self-pruning and diameter growth of oaks in a thinning experiment in Johanniskreuz/ Palatinate forest (Spiecker).

2) Investigations on the effect of artificial pruning of broadleaved species- Branch occlusion, impact of pruning technique on discoloration etc. on an agroforestry site in Breisach as an example (Schuler/ Spiecker).

3) Artificial pruning of broadleaved tree species to control and accelerate natural pruning on selected sites (Spiecker in collaboration with Günther Hepfer Altenkirchen, Ichenheim).

4) Options for improving high- value timber production with oaks by artificial pruning (two sites: Schutterwald/ Rhine valley and agroforestry plot in Breisach) (Schuler/ Spiecker).

5) Controlling diameter growth of oaks in the Ukraine (in collaboration with the State Forest Technical University, Lviv) (Spiecker).

6) Dynamics of diameter growth and self-pruning in a mixed broadleaf thinning experiment in the Rieselfeld, Freiburg (Spiecker/ Schuler).

7) Effects on release on self- pruning and diameter growth of oaks in a thinning experiment in the Mooswald (Spiecker/ Schuler).

8) Effects of release on self- pruning and diameter growth in a mixed broadleaf thinning experiment in the Kaiserstuhl (Spiecker).

9) Effects of release on self pruning and diameter growth of beech in a thinning experiment at the Schönberg (Spiecker).

10) Determination of the optimal height of the crown base derived from the timber diameter- price- relations, using oak as example (Spiecker).

TOPICS FOR MASTER- THESIS

11) Light models for valuable tree species: Analyses of species-specific crown shade cast (Experimental area: Breisach, Kaiserstuhl) (Morhart/ Sheppard/ Schuler).

12) Impact of (different) pruning (methods) on shade cast of valuable trees. Light measurements before and after pruning measures (Schuler/ Sheppard/ Morhart).

13) Growth models of broadleaved tree species as walnut, cherry, *sorbus*- species and chestnut, deduction of species- specific management guidelines (Schuler).

14) Impact of different pruning systems on branch morphology of cherry trees (demonstration plot Breisach, Kaiserstuhl) (Sheppard/ Schuler/ Morhart).

15) Assessment and modeling of NTFP yield derived from Wild Cherry/Walnut/*Sorbus spp.*/Sweet Chestnut (Sheppard/ Spiecker).

16) Terrestrial laser scanners as tool for the evaluation of different pruning methods and their effects on growth (Hackenberg/ Morhart/ Spiecker).

17) Development of models for biomass distribution of free- grown trees (Ash/ Oak/ Sycamore) (Morhart/ Schuler).

18) Determination of the optimal time of harvesting of an old Norway spruce stand in the Feldberg- region (forest district Kirchzarten) (Spiecker/ Mattes).

19) Determination of the optimal time of harvesting of a Douglas fir stand in a private forest in the black forest (Spiecker).

20) Application of the future crop tree- concept: Implications of this concept in the management guidelines of forest administrations in Germany? What is the experience of stakeholders in leading positions as well as on technical level of the forest district? (Spiecker/ Mattes).

21) Do faster growing trees produce more wood? Analysis of long-term changes in tree-ring density (and carbon concentration) of different forest tree species (Norway spruce, European beech) in relation to tree age and calendar year (Kahle).

22) Short-, medium- and long-term effects of manipulated nitrogen deposition on the tree-ring density of Norway spruce at the Pfalzgrafenweiler fertilization experiment (Spiecker/Kahle).

RESEARCH AREA III: TREES AS ARCHIVE OF ENVIRONMENTAL CONDITIONS

1) Dendrochronological dating of beaver's lodges in the natural reserve "Wurzacher Ried" (Kahle, in cooperation with Dr. Thomas Kaphegyi, Chair of Landscape Management).

2) Dendrochronological analysis of the radial growth of tapped Scots Pines in the Northern Black Forest (Hakelberg).

RESEARCH AREA IV: METHODS OF FOREST GROWTH RESEARCH

1) Comparative study on the crown development of differentially released future crop trees on IWW demonstration plots (Spiecker).

2) Using repeated terrestrial laser scanning for the analysis of the crown development of differentially pruned open-grown valuable broadleaved species on an agroforestry plot in Breisach (Kretschmer/ Spiecker).

3) Optimization of wide-spacing for the production of valuable timber using the example of the agroforestry plot in Breisach (Spiecker).

4) Comparative study on tree-ring density profiles measured with a resistograph and measured based on HF- densitometry, a method developed at the chair of forest growth (Wassenberg/ Spiecker).

5) Assessment of bark features, relevant for timber quality of beech using terrestrial laser scanning- data base structure (Kretschmer).

6) Cross-dating using artificial intelligence methods: Comparing precision and performance with conventional methods (Kahle).

7) Evaluation of height growth models for the analysis of growth trends of forest trees (Kahle).

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