

## ESC 221 Study Questions 2002

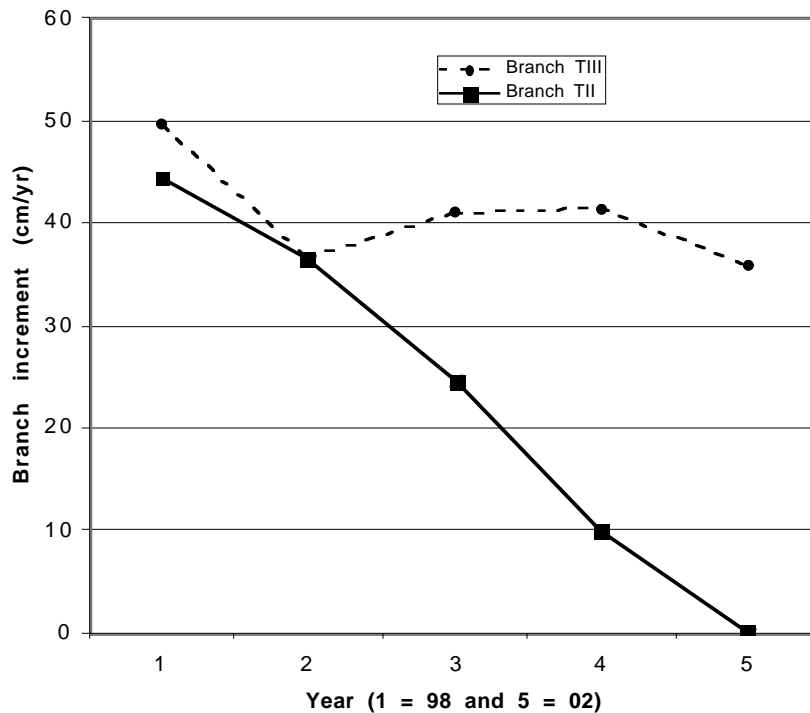
Definitions (know the meaning of the following words, be able to illustrate and talk about the importance of each):

Meristem  
Cambium  
Phloem  
Xylem  
Epicormic  
Adventitious  
Lammas  
Sylleptic

Module  
Cuticle  
LAI  
Cavitation  
Endodermis  
Respiration  
Transpiration  
Net Photosynthesis

Question 1: Understanding Type II and III sequences:

Above is the Type II and III branch growth increment sequences for Tree 5. The average for the four branches at whorl 5 were chosen for the Type II sequence and the



averages for the current increment added each year at whorl 2 was used for the Type III. Below is the data table used (and color coded for Type II: gray and Type III: yellow):

1997	1998	1999	2000	2001	2002	Whorl#
					33.5	1
				40.8	35.8	2
			34.8	41.3	19.5	3
		34.0	41.0	29.3	10.8	4
	44.3	36.5	24.5	10.0	0.0	5
38.0	49.5	29.0	13.5	2.0	0.0	6

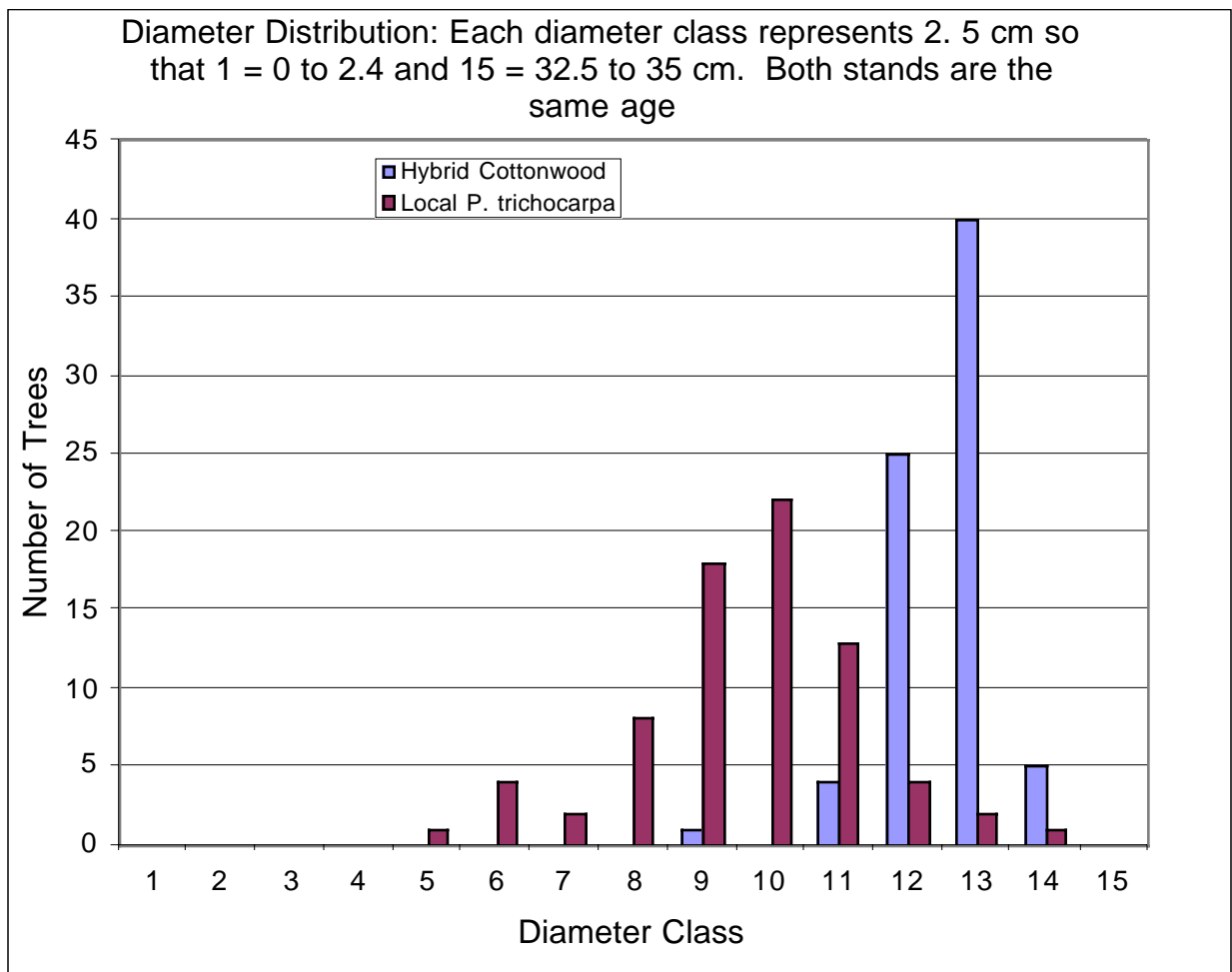
Why did branch increment remain relatively constant in the Type III and decrease dramatically in the Type II?

Question 2: How might fertilization increase leaf area index?

Question 3: Why does the net primary productivity of a stand of trees decrease after canopy closure when LAI does not decrease? List four hypotheses, pick, in your mind the most likely, and explain.

Question 4: Trees have been described as a system or complex of modules. What controls how many and which modules grow?

Question 5: Describe what is occurring in the figure below:



Question 6: Nitrogen can be allocated to different functions in a leaf. How might nitrogen availability affect its allocation? Light? Deciduous vs. evergreen?

Question 7: It is the worst summer ever in Seattle, it rains 50% of the time (plus it is a warm vs. the typical cool or cold rain) and, as a consequence, trees keep growing until the end of September. What might the consequence of this be for (1) frost hardiness and (2) your normal practice, as a nursery manager, of lifting seedlings on December

2<sup>nd</sup> from the nursery to freezer storage?

Question 8: Why might an understory tree have a low root to shoot ratio compared to the same tree had it been growing in the open? How might a low root to shoot ratio affect how an understory tree responds to release?

Question 9: How might a plant avoid the consequences of flooding? How might it tolerate the consequences?

Question 10: What is the typical hydrologic regime (flow regime of a river) for the a major westside river? How are some of the phenological events of black cottonwood linked to this regime?

Question 11: Why might stomata be closed more in a 65 m vs. a 5 m Douglas-fir tree?

Question 12: How does wind affect tree growth in the subalpine?

Question 13: Shown a picture of a western hemlock and a Douglas-fir, identify a yearly increment in height growth, where are the proleptic and sylleptic branches, which has strong apical dominance, which has strong apical control?

Question 14: Diagram on the circle below where the heartwood and sapwood would be (let's assume the tree is 25 years old)? Draw the outermost annual ring, where is the early (or spring)- vs. latewood? What function do ray parenchyma have? Draw the trace left by a branch that is still alive, died five years ago, but is still on the tree, was pruned from the tree five years ago. How about an epicormic branch that originated five years ago (or an adventitious branch)?

Question 15: On our trip to Chinook Pass, we observed subalpine fir branches with a normal looking segment for 1998, a very short segment with lots of shorter needles for 1999, a slight longer segment for 2000 with not very many needles. The winter of 1998 – 99 was a record snowfall year for the Cascades of Oregon, Washington and southern British Columbia – how might this have affected shoot and needle growth on the subalpine fir trees?