The Benefits of a Broken Branch

Figure 1 **The branch actually ripped from the base of the tree. After sawing off most of the length, I pushed it back towards the trunk.**

My son decided to pick some cherries during last week's heat wave. Luckily, 5 minutes later, he lost interest and walked away, and my daughter who normally would have been in front of the tree, was at her grandmother's, learning to bake pineapple-coconut pie. As a result, neither of them was in the way of the 15-foot branch that my wife sent crashing down, and luckily for her, she maintained her balance on the step-ladder.

After sawing it to begin the cleanup, I noticed that the tree rings on the thick branch's cross section were irregular. Why, I wondered?

In the spring, my wife's relative, a forestry student, had sent me a set of research papers by Quebec scientists who had found a correlation between temperature and tree ring thickness in the boreal forest, where moisture is rarely the limiting factor. But the cherry tree is not a conifer, and it's growing in a temperate forest biome. Other hypotheses came to mind.

Figure 2 **The cross section of the branch whose tree rings were measured.**

First I drew a radius through the widest gaps (the rings were not perfect circles) and measured all the rings(figure 1). The branch was at least 11 years old. Then I consulted Environment Canada to obtain precipitation and temperature data in Montreal for that time period. Here's what I found.

	avg.temp	mm precip	avg.temp	mm precip	avg.temp	mm precip	avg.temp	mm precip
	apr		**may**		**june**		**july**	
2012	6.8	67	15.9	91.8	20	73.6	22.3	94.2
2011	6.6	134.4	14	144.8	19.3	93.8	23.1	59.2
2010	9.5	89.4	15.7	38	18.4	158	23	96.6

2009	7.7	76	12.7	93.2	18	74.6	20	116.6
2008	8.1	74.8	12.4	74	19.9	70.6	21.5	118.8
2007	5.8	139.6	13.7	63.2	19.6	60.4	20.4	106
2006	7.6	114	14.5	173.4	19.2	104.2	22.6	135.2
2005	7.7	158.8	17.4	113	21.5	129	22.2	125.6
2004	6	68.8	13.5	81.8	17.5	64	21.5	139.4
2003	4.2	76.9	13.4	110.5	18.8	70	21.6	54
2002	6.9	79.9	11.3	127.5	17.5	106	22.1	55

avg.temp	mm precip	avg.temp	mm precip				
aug		**sep**		**AVG temp**	**total mm**	**avg july, aug, sep**	**total july, aug, sep mm**
22.2	48.2	16	103	17.2	477.8	20.2	245.4
21	224.8	17.7	110.4	17.0	767.4	20.6	394.4
20.9	139.2	16.3	157.2	17.3	678.4	20.1	393
20.8	81	15.3	44.8	15.8	486.2	18.7	242.4
19.7	77.6	16.7	49.4	16.4	465.2	19.3	245.8
20.1	80.4	16.7	47.8	16.1	497.4	19.1	234.2
19.3	154.4	15.1	65.4	16.4	746.6	19.0	355
21.7	134	17.4	113	18.0	773.4	20.4	372.6
19.3	90	16.4	71.8	15.7	515.8	19.1	301.2
21.6	79	17.7	104	16.2	494.4	20.3	237
21.8	11	18.3	64.5	16.3	443.9	20.7	130.5

At first, there seemed to no correlation of any kind. Here's a summary of the hypotheses I entertained:

Hypothesis	***Results***
Temperature is the variable responsible	No correlation
Total precipitation from April to September is the variable responsible	No correlation
A combination of precipitation and temperature plays a defining role.	No correlation
If a specific cold spell after flowering affects cherry production, the tree will subsequently have more energy to devote to trunk growth.	No data
Erratic fertilization could be the limiting factor	No data
Most trunk growth occurs in July, August and Sep after cherry production and temperature during those months will be the controlling factor.	No correlation
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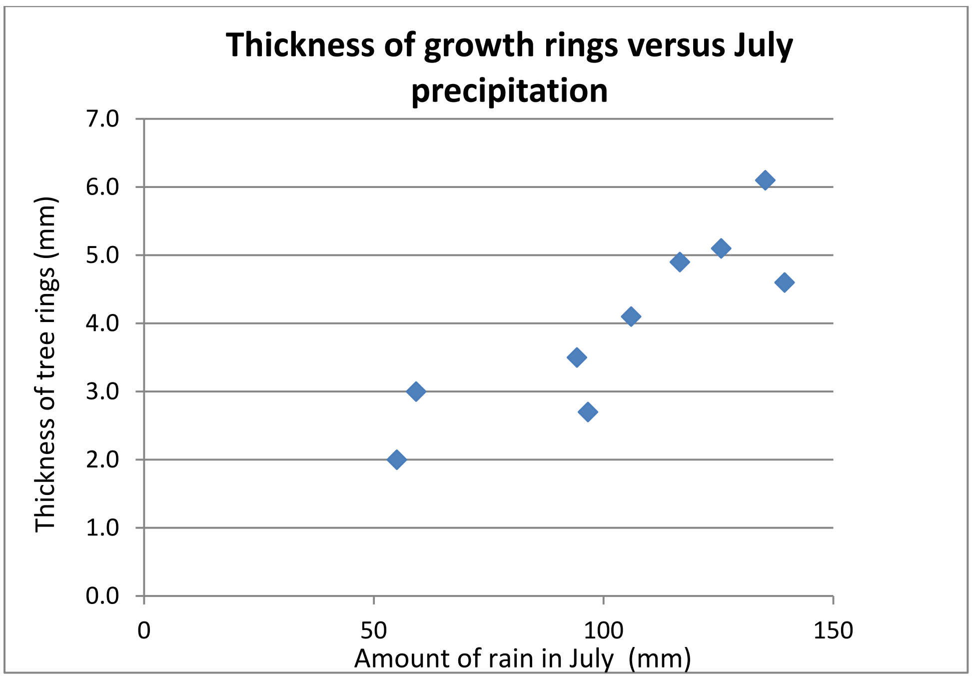
Then I thought of the possibility that most of the trunk growth occurred in July, and that the controlling variable was moisture. Since we rarely, if ever, water the tree, trunk growth suffers when not enough rain falls. During that month, the days are still close to being their longest, and the tree is no longer devoting energy to producing fruit.

The correlation was stronger, but still disappointing. If, however, out of the eleven years, I ignored two of them, when other factors could have caused anomalies, the correlation coefficient became 0.88.

But, pardon the pun, was I merely cherry-picking the data? Also, was there anything in the research literature to support the idea that the bulk of cherry trunk growth did indeed occur during one single summer month?



	July mm rain	width of ring
2012	94.2	3.5
2011	59.2	3.0
2010	96.6	2.7
2009	116.6	4.9
2007	106	4.1
2006	135.2	6.1
2005	125.6	5.1
2004	139.4	4.6
2002	55	2.0
	correlation	0.88

I contacted an Oregon State University horticultural scientist, Todd Einhorn, summarized my adventure and waited for a reply. Surprisingly, he responded on the same Sunday and wrote:

Thanks for your interesting email.

We have documented, as others have, the rapid growth of trunks after harvest. It appears that trunks compete poorly for carbohydrates when other sinks are active; fruit having the greatest sink strength. So, your findings are supported. Regarding the omission of 2 years of data...I imagine you would have to run stats for spurious data. Nine of eleven years isn't bad!, what do you suppose could have resulted in the deviation? Perhaps low temperature injury (affecting either cambial tissue, or reducing bloom resulting in light crop loads) be a contributing [covariate] factor?

Regards
Todd

Figure 3 This batch of cherries is actually not from the broken branch but from an adjacent one.

Not only did the broken branch lead to some interesting science, but it yielded over 25 pounds of cherries. Most fruit from an unbroken branch would have remained out of reach but would have been well within the grasp of competing birds. Now that the pineapple-coconut pie has been hovered, we can feast on cherry pie and jam. After that, it would be nice to get data from more trees in the city!