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Comment

***Interactive comment on* “Effects of thinning and fertilization on soil respiration in a cottonwood plantation in Iceland” by J. Á. Jónsson and B. D. Sigurdsson**

Anonymous Referee #1

Received and published: 2 November 2009

General comments: This paper is a good addition to research that began as an experiment in forest production in the southern coast of Iceland in the early 1990's. The authors show that soil respiration rates are affected by thinning and that temperature seems to be the driving environmental variable.

Specific comments: Section 3.4: Presumably, the increase in soil temperature is a direct result of more incident solar radiation reaching the surface. At this high latitude, this effect would be maximized in the summer months with long day lengths as is seen in Figure 4. In summer, did the authors notice an effect of clear vs. overcast days? I recognize that clear days are not common in this area.

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All thinned trees were left on floor to decompose. Is this the commercial practice? Is the species used for other purposes and therefore they would be removed? In the conclusions, the authors state that fertilization increased soil respiration but thinning intensity decreased it even though all organic material was left at the site. I presume that the authors' intention here was to indicate that this additional organic matter would decompose and provide additional respiration. Would they expect decomposition to be an additional factor in the first year? Perhaps the litter caused soil temperatures to be reduced (less incident solar radiation) therefore reducing respiration – was this an effect that was considered?

The site is located in a high precipitation and high cloud cover region. The temperatures experienced are fairly low overall and the growing season is fairly short. Would the authors comment on the larger context of their respiration rates? Are these significant beyond the local Icelandic context?

Technical corrections: p.9260 line2: change 2nd to second

p.9260 line11: insert comma “In 1990, . . .”

p.9262 line2: Likely should be “Centre for Chemical Analyses”

p.9262 line17: “calculations of LAI were limited to . . . due to the relatively small . . .”

p.9262 line21-22: What does “receptively measured” mean?

p.9262 line22: “. . . with a closed-chamber . . .”

p.9263 line5: change constantly to continuously

p.9263 line8: “. . . and both were stored as . . .”

p.9263 line9: You have already mentioned air temperature was measured in each plot. Give the height of the measurement from the central tower. You may want to give the other instrument heights as well.

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p.9263 line19: "...on measured air and soil temperatures."

p.9264 line20: "...in 2004 were..." In this sentence, I assume that the temperature is an annual average; the precipitation is a total and the irradiance is...?

p.9265 line2-3: "...on a warm summer day with a temperature of 18°C in the unthinned treatments, the air temperature would be 19.3°C..." Also, remove the + sign in front of temperatures; it is assumed.

p.9265 line7: Insert commas "...treatments had, on average, 1%..."

p.9265 line12: "Soil respiration in the thinned treatments generally followed soil temperature and increased from spring..." Which soil temperature is plotted here? The un-thinned control, or an average of all treatments?

p.9265 line21-25: I needed to re-read this passage a couple of times with reference to Figure 6. I believe that the authors were speaking of comparisons between each of the treatments and the control. e.g. C-00 and F-00 and so on. Figure 6 clearly shows a decrease in respiration by treatment within the fertilized or non-fertilized plots. The statement of increased fertilization across the all three thinning treatments is therefore a bit confusing although correct when examined more carefully. Would it be better to rearrange the plot such that the C-00 and F-00 are side by side etc.?

p.9268: I agree. Beyond the study mentioned, long-term fertilization studies elsewhere have also indicated reduced respiration (e.g. Bowden et al., 2004. Forest Ecology and Management 196; 43–56).

p.9264 line7-8: It is stated that when compared across treatments, thinning had a negative effect on N concentration. More specifically, do the authors mean that compared with control, each of the thinned treatments was less than the control? It seems as though F50 had the lowest nutrient status and smallest error bound. Any thoughts? Similar clarification for the data in Figure 2. The statement is simply that compared to control, each thinning treatment individually was different from control.

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Figure 1 and other captions: Change existing to “. . .in unfertilized (C) or fertilized (F) treatments. . .”

Figure 3 and throughout the m/s. The authors use both Irradiance and Global Radiation to describe the measured incoming shortwave radiation received above the plantation. From the Glossary of Meteorology: “Global radiation is the total of direct solar radiation and diffuse sky radiation received by a unit horizontal surface” and is measured with a pyranometer. Irradiance (radiant flux density) is “a radiometric term for the rate at which radiant energy is transferred across a unit area of a surface. . .in a hemisphere of directions”. I prefer global radiation which refers explicitly to the solar (shortwave) part of the spectrum and is derived through a measurement device.

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