03-Oct-2016

Dear Editor,

Thank you for the invitation to submit a revised version of our manuscript ECY16-0167.R2, entitled ‘Caterpillar seed predators mediate shifts in selection on flowering phenology in their host plant’.

We thank the editor for the thorough suggestions, and we have now carefully addressed all the edits suggested. We provide below a list of responses to each of the comments, including a discussion of several of the issues addressed.

Thanks again for your consideration of our manuscript.

Yours sincerely,

Alicia Valdés, on behalf of both authors

Response to review

Editor’s comments

*Line 10.  Change to "Selection on the time of reproduction...".*

This is now changed.

*38.  Remove "the" at the end of this line.*

This is now removed. *55.  Rewrite this to be: "Antagonistic interactors, such as seed predators, have...".*

This is now changed.

*62.  Rearrange so that it reads: "Phenargis larvae also need . . . ".*

This is now changed.

*106.  Unless this were based on preliminary data or personal observations, this statement about predation intensity is odd in the methods (because it's really a result), and could be removed from this section.*

This is now removed.

*110.  For accuracy, you should state here if shoots were selected randomly or haphazardly.*

The focal shoot was not selected randomly. Instead, we visually evaluated the height of all the shoots belonging to the same individual, and selected the one having median height as the focal shoot. We have tried to clarify this now, by writing “For recordings, we selected one focal shoot in each individual as the one having median length among all the shoots belonging to the same individual”.

*135.  I am sorry to have to return to this section, which has been confusing to reviewers and I'm still confused by your explanation.  I have no objections to your methods, I'm just going in circles with the language of these few lines.  First, what does it mean for two individuals to have "the same difference" in developmental stage?  Do you mean at two points in time? The two individuals shift their phenology across time? or the "difference" is between individuals at different times?  I'm thinking that my confusion stems from that (and from "equal differences" in developmental stage), and the next couple of lines don't work because of that confusion.  Please take another shot at re-writing this.*

We agree that our explanation still was not clear enough. In particular, the meaning of “the same difference” might have been confusing. What we are referring to is that a given difference in development at a given point in time might be associated with smaller or larger differences in date of first flowering depending on temperatures. We have now tried to rewrite this part to clarify our reasoning, and now provide a more specific example. We hope that the explanation is now easier to understand.

*207.  Change to "We first fit global models...".*

This is now changed.

*211.  Maybe this is correct (in which case don't change it) but it seems odd to me that your nested models would really have the "same causal structure."  If they had the same causal structure, what is the point of comparison?*

By “sharing the same causal structure” we meant that the nested models maintained the direction of the paths considered in the saturated model, i.e. the effects were in the same direction. But we agree that this could lead to confusion, and have now removed this statement.

*260.  Change to "higher numbers of flowers".*

This is now changed.

*276.  Change to "leads."*

This is now changed.

*284.  Did you mean to say "an additional 26.4%"?  If not, just delete "also".*

No, we did not mean that. This is now changed.

*286.  Should that be 22%?  As it is, 0.22% is implied.*

0.22% is correct. We now changed to 0.2 to avoid misunderstanding. *304.  The first sentence of this paragraph is redundant with statements in the previous paragraph.  I would simply delete and start with the next sentence.*

This is now changed.

*311.  It would be helpful if you suggested parenthetically why this might be.  For example: ". . . directly increasing fitness (for example through exposure to a different suite of pollinators), or from other...".*

This is mentioned earlier in this paragraph, but now we repeat it here: “directly increasing fitness, e.g. by increasing time and resources for seed maturation, …” . *319.  The logic of this paragraph is a tad slippery to me.  If you get a positive effect of later flowering after removing the effect of the eggs, wouldn't that suggest the importance of some other factor (such as exposure to a different set of pollinators, or better abiotic conditions, etc.).  Instead, you suggest an effect of escaping predation, after you have statistically removed the effect of predation.*

It is true that these analyses accounted for the effect of the total number of eggs that were laid on the whole shoot. However, phenology might not only influence the total number of eggs, but also the distribution of eggs among flowers within the shoot. Such effects on distribution among flowers within shoots were not accounted for in the analyses. Our point is that in early-flowering shoots all flowers are exposed to butterfly oviposition, resulting in a relatively even distribution of eggs among flowers within shoots. However, in late-flowering shoots late-opening flowers might often escape predation because they develop after the period of butterfly oviposition. As a result, a given number of eggs might result in that a higher proportion of fruits escape butterfly attack in late- than in early-flowering individuals (i.e. the eggs would be more aggregated in late-flowering individuals, and more evenly distributed among the different flower buds in early-flowering individuals). The implication of this would be that also some of the positive direct effects of a later flowering in the path models might be mediated by predation, and that the effects of phenology via predation are stronger than suggested by the path coefficients.

*336.  This has now been said many times, consider removing this sentence (the one that starts with "Because of its preference...").*

This sentence is now removed.

*338-339.  You can remove the second half of this sentence.  There are people that make a good argument that a proper path analysis based on observational data does indeed reveal causation.  Obviously you don't need to get into that debate.  But you can remove the issue here, because the statement later on 358 is sufficient to cover it.*

This is now changed. *357.  Remove "also."*

This is now removed.

*385.  The next step might also be to understand selection on phenology of the butterfly!  (Just a thought, you don't need to modify text.)*

We agree that it would be really interesting as a next step. *386.  Use "likely" instead of "probable".*

This is now changed.

*393.  Remove "the" in front of environmental, otherwise it suggests that you have identified a suite of factors.*

This is now changed.