Am Nat Reviews

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| |  | | --- | | **The American Naturalist <em@editorialmanager.com>** | | | | AttachmentsFri, May 24, 4:44 PM (4 days ago) |
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| |  |  | | --- | --- | | |  | | --- | | to Jenna  https://mail.google.com/mail/u/0/images/cleardot.gif | |   MS #59115  I was very interested to read about your work testing hypotheses about how the strength and nature of interactions between a desert shrub and a co-occurring annual plant might change through time. With a combination of a manipulative experiment and observational data, you show that proximity to the shrub promotes the occurrence of annual plants at the vegetative stage, promotes a greater total diversity of arthropods, and reduces pollinator visits to the annual associate when both the annual and the shrub are flowering. Dr. Sargent and the reviewers were excited by the goals of your work and impressed by the level of effort it entailed. However, they struggled to follow some aspects of the design of the study and data analysis, and also question several of your interpretations of results. A key point in my mind is that because you did not measure the consequences of either arthropod diversity or pollinator visits for annual plant reproduction, you cannot convincingly diagnose the nature of the interactions at these stages. For example, if seed production by the annual is not pollen limited even when the nurse shrub is in bloom, then there might not be a negative relationship between the two species. Thus, although you identify a mechanism by which the sign of the interaction could change over the life cycle of the annual plant, your results are not conclusive.  These initial findings are intriguing with respect to what they might mean for how species interactions change across the life cycle. However, I agree with Dr. Sargent that the work has not yet reached the point where it would be relevant to a broad audience like ours. She and both reviewers offer sound advice for how you might improve the presentation of the work and temper some of the inferences you draw from the results. I hope you will find their input useful in refining the paper for submission to a journal with a stronger focus on advances in empirical ecology or plant biology. |

I have now received two reviews for MS 59115 “Facilitation with a grain of salt: disentangling…”. In this paper the authors describe an experiment designed to assess ecological impacts of the desert shrub, Larrea tridentata, on the co-flowering annual plant, Maacothrix glabrata. Using an experiment where they placed potted plants either underneath or adjacent to a shrub, they measured the impact of their manipulation on pollinator visitation and pollen deposition. They also surveyed the plant and arthropod communities at the two types of (micro)site. The authors found lower floral visitation at the shrub microsite, which declined further as the flowering season progressed. There was no impact of proximity to a shrub on conspecific pollen deposition, while the arthropod community and ground vegetation did vary significantly among shrub and non-shrub sites.  
  
While I agree with reviewer 2 that this manuscript represents a lot of interesting work and data, I also agree with both reviewers that the writing is unnecessarily complex (and a lot of jargon is used), which makes the ms difficult to follow in many places. I think reviewer 2 is spot on that a clearer writing style that follows a well-thought out outline would make this manuscript much more accessible.   
  
In the abstract, the authors use the term ‘trade-off’, which is confusing because I don’t think the paper is generally addressing trade-offs. Similarly, they state in the last sentence of the abstract that ‘documenting these trade-offs will advance both ecological interaction theory and assessment of selection processes that drive co-evolutionary relationships’. This is considerable overreach relative to what the manuscript actually does – personally, I much prefer a more straight forward writing style as it is so much easier to read and interpret. I think a more straightforward style should be adopted throughout the manuscript.  
  
In the methods, I was struck by the fact that the shrub and non-shrub sites were only located 1.5 m apart. Even small bees typically travel several 100 meters for foraging, so it’s unclear to me why sites less than 2 m apart could be considered independent in terms of the impact on pollinator visitation? Reviewer 1 was curious to know whether it’s possible that the transplant manipulation itself could have impacted visitation – I think this is a good point – did these plants suffer trait changes (wilting etc.) that could have differentiated them from how naturally occurring plants might receive visits/pollination?  
  
I was also curious about the focus on pollination and not pests – given the impressive arthropod community harboured by the shrubs, is it not equally possible that plant-pest interactions are likely to be higher under shrub canopies than at open sites?  
  
L198 – I think it would help to separate the pollen count from the visitation data – it’s not entirely clear here why there is a differentiation between visitation and foraging instance. The latter term is not commonly applied in pollination biology and makes the method and results difficult to interpret.  
  
Like reviewer 2 I would like to see some explanation for the distributions/link functions used in the GLMM. Also, how was the fit of these distributions assessed?  
  
On L314 I did not understand how the equation worked (what about treatment or control?) and I did not understand the logic behind it. Please explain better what this is representing.  
  
L324 – I think that if summary stats are given they should be at the level of the replicate (e.g., how many insects visited per site, etc.). Such broad stats are hard to interpret without the context of the experimental design units.   
  
L402 – cornucopian flowering strategy is not one I’m familiar with - could this be written differently?  
  
I agree with reviewer 2 that caution should be taken with the conclusions with respect to phenology, which could be due to seasonal changes in the pollinating fauna and cannot be attributed to shrub flowering per se (for the reasons outlined).  
  
I was confused how conspecific pollen could stay the same with distance while heterospecific pollen increased – did the overall amount of pollen increase with distance from the shrub?  
  
On L457, germination is mentioned for the first time. As far as I can tell the study does not address germination in any way, so why is this here?  
  
Reviewer 1 raises a good point that future directions/caveats are missing from the discussion.  
  
Minor comments  
  
L134 – just say 70 m lol DONE  
  
L 159 and throughout – don’t forget that you must use the full genus name at the start of a sentence  
  
L274 – I didn’t understand this – was visitation time still standardized to the length of time it was monitored? Because if not, how do you correct for the sampling effort impact on the results?

DONE  
  
Figure 2 – could you indicate which are statistically different?  
  
Tables – generally the formatting of the tables is strange, there are font size changes that don’t seem to be meaningful? I would indicate the link function in the table titles.  
  
Overall, while this is an interesting study that represents a lot of work, in my opinion it is not of broad enough interest for publication in American Naturalist. I suggest that the authors take these comments into consideration and submit the manuscript to a more specialist journal in ecology or botany.  
  
Sincerely,  
  
Risa Sargent  
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Reviewer #1:   
  
I request that my review not be shared with any third party, as it is written exclusively for the American Naturalist's Editorial Board, authors, and fellow reviewers of this paper.  
  
COMMENTS FOR THE AUTHORS  
General comments  
  
Summary: The main goal of this study was to assess how a foundation plant, Larrea tridentata, affects local plant and insect communities and how flowering phenology may influence the strength and direction of interactions. The authors did a series of field experiments in the California desert to test their predictions. First, the authors predicted that pollinator visitation rates to M. glabrata change when L. tridentata begins flowering. The authors set up M. glabrata plants underneath and far away from L. tridentata plants and assessed pollinator visitation using camera observations. They found that pollinator visitation was higher to M. glabrata before L. tridentata began blooming and M. glabrata plants directly next to L. tridentata suffered from reduced visitation. The authors tested a second prediction, that conspecific pollen deposition to a M. glabrata varies with distance from L. tridentata. The authors collected stigmas from M. glabrata naturally occurring plants  
underneath L. tridentata plants and from plants in open microsites. The authors found that conspecific pollen deposition did not vary with distance to L. tridentata. Finally, the authors tested how L. tridentata affects annual percent cover and arthropod abundance. The authors censused annual plant cover under L. tridentata and in open microsites. They found that annual cover was higher under the canopy and they attribute this to amelioration of stressful conditions (temperature). The assessed arthropod abundance using pan traps. Again, they found that arthropods abundance was lower in open microsites relative to under the canopy. However, species richness of both annual plant community and arthropods was not affected. The researchers split their observations into the time period before L. tridentata bloomed and after it started flowering.  
  
I was very excited to review this paper after reading the title and the abstract. Understanding how a single species exerts positive and negative effects on neighbors is not an easy undertaking, although necessary for the field of ecology. The authors did a significant amount of work in the field and both in preparation of this manuscript; however, I believe the manuscript could benefit from a considerable amount of editing.   
  
\*       Introduction: I think the idea of testing how a single species positively and negatively affects trophic and non-trophic neighbors is critical to our field. Unfortunately, the introduction is very complicated, which buries the main message of your study. If you have time, spend more time constructing your introduction. In general, I would also caution against making this manuscript one about phenological shifts. I am not convinced that plants before they flower (and actually had flowers) and flowering truly affect the arthropod and annual plant community, as so much changes over the season. Since you didn't experimentally manipulate phenology, I would reconsider spending so much time focusing on it in your introduction.   
  
\*       Methods: You did so much work! It is something to be quite proud of. When I was reading the methods, it took me a long time to really understand how you conducted your observations. I made specific notes below, but please spend more time clarifying your methods, especially identifying insects and describing your pollinator observations. Additionally, please describe why you made some decisions regarding statistics. For example, you glmms with different error distributions but never stated why. Just a little bit more information in this section would be useful for the reader.   
  
\*       Results: I think you could write your results in a way that mirrors your predictions. As you have it right now, I found it very difficult to connect your predictions with the results. Your figures are simple and quite clear, but could benefit from labels and more detailed figure captions.  
  
\*       Discussion: I think the discussion is a place where you could really tie all of your field observations together into one unifying message. Right now, the discussion jumps back and forth between your different observations and makes claims that I don't think you explicitly tested (see specific line comments below). I think once you reframe the introduction, it will be easy to reframe the discussion.   
  
  
Thank you for sharing your work with me. I am really excited by the concepts presented in your manuscript.  
  
  
Specific line comments  
  
L26: "for participants" I would be specific; do you mean for both plants and pollinators? It would be helpful for the reader if you set us up for what you are going to be talking about specifically.  
  
L27: Are the fitness consequences of the indirect interactions considered the indirect consequence? If you have time, try to make the language in this sentence clearer.  
  
L29: The term phenological shift is often used to describe climate-induced changes in timing of biological events. Although you use it in a perfectly sound way here, some folks may instantly think you are studying how flowering is shifting over time. It is up to you whether you wish to change the language. After reading your introduction, it is quite clear that you mean the shift from not flowering to flowering over the life cycle of L. tridentata. This is just something to consider as you make edits.   
  
L30: Instead of "positive ecological effect," "positive effect" would suffice and make the sentence simple.   
  
L30 - 33: "This shrub species also facilitated abundance and richness of the arthropod community but had indirect negative effects on pollinator visitation to a flowering annual plant which intensified into exploitation competition upon blooming." Just to help the reader, I would break this sentence into two. You are talking about two separate results here. Additionally, you may think about writing the abstract so that the order of your results matches the order in which your predictions are presented in your introduction.  
  
L33 - 37: "Phenology and life-stage can thus shift the net outcome of association with foundation plant species in facilitation complexes. There is the capacity for these trade-offs to be widespread and an increasing focus on further documenting these trade-offs will advance both ecological interaction theory and assessment of selection processes that drive co-evolutionary relationships between shrubs, annual plants, and pollinators." I think what you are saying here is that the timing that one characterizes an interaction between plants may affect whether the interaction is positive or negative. I am not sure if the switch between being a competitor and a facilitator is necessarily a trade-off. Furthermore, you are testing whether L. tridentata facilitates understory vegetation (through direct effects?) and indirectly, through pollinators. I would make that clear to the audience in your abstract.   
  
L40: "Interactions between species" could be shortened to species interactions  
  
L43 - 46: "These positive interactions lead to patterns in species coexistence within plant communities (Valiente‐ Banuet and Verdú 2007; Brooker et al. 2008) including the frequent association of annuals with shrubs in arid ecosystems (Facelli and Temby 2002; Holzapfel et al. 2006; Pugnaire et al. 2011)." This sentence is a little confusing, but I think with a little bit of work your message could be made clear. I think the phrasing "patterns of species coexistence" is vague. Do you mean that annuals are often associated with shrubs in arid ecosystems, because shurbs create a stable habitat for them? In that case, I would remove "species coexistence" completely or spend another sentence or two explaining the concept in more detail.  
  
L48: "Nurse" plants are a well-known term among plant biologists, but I think "protégé" is used more infrequently in the literature. If you have room, please give a quick definition for those who may not have the term in their vernacular.   
  
L50 - 54: "Direct interactions between shrubs and annuals can be simultaneously facilitative and competitive (Bertness and Callaway 1994; Callaway and Walker 1997; Holzapfel and Mahall 1999). However, these pairwise interactions are often inadequate to predict actual observed net outcomes in natural ecosystems (Callaway 54 and Pennings 2000)." I think the idea that plants can simultaneously compete and facilitate is a really interesting concept to bring up since your study looks for both negative and positive interactions between co-occurring species. However, you don't spend that much time on this thought aside from the first sentence quoted here. Can you include one more sentence in between the two in quotes to give an example of what you mean? In the second sentence, I am a little unsure of what pairwise interactions you are referring to. Overall, I think you might want to consider simplifying the first paragraph of your introduction. You introduce a lot of complicated  
topics and it may benefit your reader if you start off with the broadest topic and work your way down.   
  
L59 - 60: Plants can interact through pollinators in many capacities mechanistically (Braun and Lortie, 2018). What do you mean? This sentence is vague.   
  
L60 - 61: "Shrubs and annuals with overlapping phenologies likely interact through mechanisms mediated by pollinator responses to floral resources." Please include a citation here. I know this sentence sets up the reader for a deeper discussion of this starting on lines 69, but the sentence seems out of place or not as informative as it could be here.   
  
L61: "i.e. magnet species" should be "i.e., magnet species,"  
  
L62: "which benefits their less attractive neighbours" I would use past tense since you are describing the results from studies that have already occurred. "which benefited their less attractive neighbors"  
  
L63 - 65: "Many pollinators forage optimally (Pyke et al. 1977; Pyke 2016), thus co- blooming, associated plants can jointly improve their pollination success by combining their floral displays to increase the size or diversity of the resource pool." This sentence makes it sound like the plants choose to flower at the same time as neighbors. Although this might be happening, flowering is also constrained by the abiotic factors. Please rephrase this sentence.   
  
L74: "Lonicera" give full species name and family  
  
L77 - 78: "Consequently, direct and indirect shrub effects on other species function simultaneously to shift net outcomes even within predominantly net positive facilitation complexes." I think this sentence could be clearer and stronger. You spend a lot of time describing how large shrubs could both be a benefit and a detriment to small annuals via pollinators. I think what you are saying is that although shrubs are typically thought of as "nurse" plants and they provide benefits, it could be the case that they are not and that is why you are doing your study. Just spend some time tightening up the language here. Sometimes, simple language is better for readers!   
  
L81: "literature for communities" I would specify, plant communities.   
  
L81 - 85: "The context-dependence of species interactions leads to shifts in their (who is they) strength or sign across gradients, space and time (Chamberlain et al. 2014), and as well as across the life stage of the protégé species (Valiente-Banuet et al. 1991; Pugnaire et al. 1996; Callaway and Walker 1997; Rousset and Lepart 2000; Bruno et al. 2003)."   
  
L 85 - 87: "There is evidence that earlier life stages experience higher relative mortality rates (Fenner 1987) and that annuals benefit most from shrub facilitation (Holzapfel and Mahall 1999)." Make it clear to the reader whether you are talking about annuals in the first half of the sentence, too.   
  
L 87 - 89: "However, the life stage shift from vegetative growth to reproductive growth is a major event in resource allocation (Bazzaz et al. 1987), and thus reproductive output and fitness consequences are ultimately also important life stages." Don't start a sentence with however. The second part of the sentence is not clear. I would remove this or make it a separate sentence.   
  
L91 - 94: "Intra-seasonal phenology is thus a component of interactions in tightly coupled plant systems sharing pollinators that must be examined to better examine sensitivity of positive interactions and selection processes that stabilize diversity." I think this is another one of your take-home messages as to why your study is important. You characterize the sign of species interactions before and after flowering in the foundation species. I think the addition of "selection processes that stabilize diversity" is quite vague. Either include references for the reader to follow up on, remove this part of the sentence, or make the definition of this clearer.  
  
L 95- 96: "The Mojave Desert is a biodiversity hotspot supporting at least 659 species of bees (Saul-Gershenz et al. 2012) and 1680 species of vascular plants (Rundel and Gibson 2005)." You could start with the plants first, since they are a lower trophic level. Minor comment, so take it or leave it.  
  
L97: Southwestern Deserts is capitalized, but it is not in L99. Be consistent.   
  
L106: i.e.,   
  
L95 - L111: This paragraph provides a lot of good information about the natural history of pollination in southwestern deserts. By the end of the paragraph, I am not convinced that pollinators are generalists since you provide so much evidence for specialization. Can you spend some time diving into the evidence (preliminary or otherwise) why you might find generalist pollinator species.   
  
L112 -  113: "The purpose here was to examine both the direct and indirect effects of Larrea tridentata on the general success of its annual understory." This is just an example, but you use passive voice here and active voice in the methods. I would recommend switching all of your language to active voice. It is clearer and often used in manuscripts.   
  
L113 - 116: "Single species of plants that are sensitive to environmental variation are called phytometers in the plant sciences (Clements and Goldsmith 1924) and have been recommended as a tool to study the relative importance versus intensity of plant-plant interactions as well (Brooker et al. 2005)." I would argue that all plant species are sensitive to the environment (either abiotic or biotic) in some way. Is this term used in recent scientific literature? Your citation is from 1924. I would remove this sentence from your manuscript and not refer to the dandelion as a phytometer. You could make a case for why it is important ecologically as a neighbor without this additional term.   
  
L118 - 120: "These species co-flower at beginning and ends of their bloom period (Jennings 2001), and are thus a relevant system to model changes in net interactions within a growing season." First, what do you mean? Does one species flower before the other and therefore the end of one's flowering period overlaps with the beginning of the other? Or do they co-flower completely? Secondly, remove the comma. Since the subject of the verbs are the same, the comma can be removed.   
  
L120 - 125: "We examined the hypothesis that pollinator-mediated interactions between a foundation shrub species and a common annual species shift with phenology and life- stage. The following three predictions were tested: 1) Pollinator visitation rates to a common annual changes with shrub phenology. 2) Conspecific pollen deposition to a common annual varies with distance from the shrub canopy. 3) Shrubs facilitate annuals and arthropods though amelioration benefiting abundance and richness." 1. Make sure to match passive or active voice between these sentences and in the entire manuscript. Also, do you have a prediction for the direction of change? Would you expect visitation rate to decrease when L. tridentata begins flowering? 2. Is there a difference between phenology and life-stage? Or do you just mean pre-flowering and flowering of the foundation species? 3. What do you mean by "though amelioration benefiting abundance and richness." You are not explicitly testing  
mechanisms here, so I would remove the word amelioration. Furthermore, do you mean arthropod richness and abundance?   
  
L125 - 129: "Understanding interactions for pollination at a community level is critical for understanding potential impacts of any decline in pollinator populations. If shrubs tend to facilitate their understory annuals, they will buffer the effects of pollinator declines on the plant community, but if shrubs typically interfere with pollination for annuals, the sensitivity to change for the community increases." I think these sentences are a distraction. The last paragraph of your introduction should alert the reader to exactly what you are doing. I think these sentences could go elsewhere in your introduction if you like, but I am not sure that bringing in a new concept (pollinator declines) makes sense here.   
  
L 134 - 139: Sometimes authors include the families in parentheses when a species is introduced for the first time. I think it is helpful as a reader, since I don't always know the genus and species that the experiment is done on. If the family is included, I can often draw parallels to other studies of species in the same family. Take or leave this comment!  
  
L139 - 141: Are the two sites similar? Why did you use two sites? Perhaps mention that you use two sites right at the start of this paragraph instead of waiting until the end.   
  
L143 - 145: You switch between tenses in these two sentences. I understand why, since you are describing how long that plant has been a part of the community and then you discuss some of its adaptations to the harsh environment. I am not sure if there is a way to rectify this, but it doesn't read as well as it could if both sentences were in the same tense.   
  
L147: "Clones that are over 1000 years old have been documented." Passive voice is a little confusing. Perhaps you could try, "Since this shrub species primarily reproduces clonally, genets can be long-lived for up to 1000 years (Vasek 1980). This isn't perfect, but it shortens the two sentences and provides the same information. Take or leave this comment as well.   
  
L148 - 150: "The full pollinator guild contains 22 specialist pollinators and more than 80 generalists (Minckley et al. 1999), making it one of the most diverse guilds documented ((Wcislo and Cane 1996)." First, remove the double parentheses. Second, this is exactly what the reader may be looking for when you discuss how specialized desert systems are but they are still good for studying generalist interactions in your introduction (L95 -111).  
  
L151: "L. tridentata" should be "Larrea tridentata." Always write out the first word of an abbreviation (even if previously defined) when it is the first word of a sentence. This occurs again in L154, L159, L181, L375, L390, L449  
  
L156: Remove comma (see note for L118 - 120).    
  
L157 - 160: Remove "phytometer." Why is this species important ecologically? I think the use of the word is distracting and you can just tell us why you chose it (it co-flowers with L. tridentata and is a common species, etc). Do you know if some of the pollinator species documented on M. glabrata are the same as the ones documented to visit L. tridentata? I think if you explicitly discuss which pollinators have been documented on both, it would make a stronger case for why you chose to study competition for pollinators between these two species.   
  
L142-165: Are these species pollen-limited? Are pollinators (well, pollen) really a resource that they would compete for? You may not know this, but I would tell the readers!  
  
L167 - 171: 167 "A total of 60 L. tridentata shrubs with developed floral buds and minimal perennial understory were chosen evenly distributed across the primary study site (mean shrub width: 336 cm, mean height: 209 cm). Paired shrub-open microsites were selected inside the dripline of the focal shrub and a minimum of 1.5 m away in an open area respectively."   
\*       Use active voice here and for all of your methods.  
\*       Include some measure of variation in plant size if you are giving the mean height and width (either S.E. or range?). Are height and width correlated? If so, you could report one of them.  
\*       The second sentence is confusing. Did you select one microsite under the shrub and one microsite 1.5m away? So you had a total of 120 sites (60 under the shrub, 60 away)?  
  
L172 - 174: "To separate floral and non-floral interaction pathways, interactions were tested prior to focal shrubs blooming and repeated using the same shrubs after they had entered into full bloom." I think this is the part of your project where you test your "phenological shift." I wonder if other things are changing in addition to just flowering of the shrub. For example, are there more (or different) pollinators out as the season progresses? Would differences in arthropod abundance possibly be a result of the natural history of certain insects rather than just flowering of the shrub? Are temperature and precipitation the same pre- and during-flowering? I would spend some time justifying this here or acknowledge these limitations in your discussion.   
  
L174 - 175. Why are shrubs with flowers at all considered "pre-blooming?"   
  
L182 - 183: Does M. glabrata stay fresh and attractive to pollinators when gathered? Did you remove the whole plant or just the aboveground vegetation/flowers? Did you plant them in pots with soil? Where the plants actively flowering when you placed them into pots?  
  
L184: "Conspecific floral density influences pollinator visitation (Bosch and Waser 2001)." Yes, was there already M. glabrata flowering at the site? Why did you bring it in from another sites?  
  
L185: "transplants of similar size, floral number and habit were paired" What is habit? Did you measure plant size? I would include mean flowers ± S.E. or some measure of variation. What is your sample size for this part of your experiment… 60?   
  
L188: Visitations were recorded from 11:30 am to 4:00 pm (mean length: 1:19 hr:min). If you recorded visits from 11:30A - 4:00P, why is the mean only one hour?   
  
L191: "(60 shrub/open pairs)" This is confusing. Do you mean there were 60 paired "understory" and "open" M. glabrata plants?   
  
L190 - 192: What year did you conduct this study in?  
  
L192 - 196: "To test for any influence of naturally co-occurring annuals and blooming shrubs, heterospecific annual floral density was measured within a 0.25 m2 quadrat in each microsite with the phytometer in the center of each plot, and the number of heterospecific shrubs in bloom were counted within a 2 m radius of each microsite." Why did you choose to calculate heterospecific flowering density of annuals and shrubs at different scales? Do you think 0.25m is enough to capture how heterospecific annual plant density affects pollinator visitation? Some insect pollinators can forage up to 1km. It would be impossible to capture the floral density at this scale, but it is something to consider when interpreting your results.   
  
L200: "foraging instance" do you mean the time that a pollinator spent on a flower?   
  
L202: Does foraging duration then incorporate multiple visits?  
  
L205: I think the term foraging instance is confusing here. Do you mean each time a different insect visited the flower (one foraging bout?).   
  
L206 - 208: You switch between common names (honey bees, solitary bees), orders (Lepidoptera), and families (Syrphidae). Try to be consistent… either use common name or Latin name.   
  
L210 - 212: You removed stigmas from plants at the second site, not the first? At the first site, you added M. glabrata, which isn't there normally?   
  
L213: "nine stigma per plant" should be "nine stigmas per plant"  
  
L213: "dripline" is used earlier in the manuscript. Does this mean very close to the shrub? Is there a definition for what is considered under the dripline?  
  
L214: Did you collect stigmas from potted or natural plants?    
  
L219 - 220: Were conspecific and heterospecific grains easy to distinguish? Did you have a pollen library to refer to or did you collect anthers of M. glabrata yourself so you could compare conspecific and heterospecific grains?   
  
L227: How many pan traps did you employ? How far apart did you set them out from one another?  
  
L235: Did you do the species ID or did you have them sent off? This would be clear if you used active voice.   
  
L258: "The identity and behavior" What do you mean by behavior?   
  
L270: Did you test to see if your data were over-dispersed?  
  
L278: i.e. should be i.e.,   
  
L278: Are shrub ID and microsite the same? Or would microsite be nested within shrub ID?   
  
L281 - 283: Why are heterospecific flowers only included in the additive model? Did you also include open flowers on L. tridentata? Additional factors that influence the number of visits to a flower could include average temp and day of the year (which you have). Did you try this in your models as well?   
  
L283: Why do you use a quasi-Poisson error distribution rather than a negative binomial? Did you run a test assessing how the variance changes with the mean? I think you should try to be more explicit and include citations for your model choices.   
  
L292: Did you include the number of L. tridenata flowers as a covariate? "number of M. glabrata flowers" Do you mean the total number of flowers on the plant that you collected from or the number of flowers in a specific radius or the number of flowers on the closest conspecific?   
  
L301: Did you use an R package to calculate LS means? If so, make sure to cite!  
  
L304: The term visitation rate is often used to describe visits/flowers/hour, which you did not calculate. Make sure you define what you mean by visitation rate.  
  
L313 - 315: Your description of the relative interaction index is not very clear for your project. Are pre-blooming and blooming truly controls and treatments? Since you didn't explicitly remove flowers from already blooming plants or add flowers to plants that weren't blooming, you didn't manipulate phenology yourself. Therefore, I do not think it is appropriate to calculate the RII for the pre-bloom and bloom data.   
  
L325 - 326: Given your video recordings had so many zeros (which is data!), do you think your results are zero-inflated? Would you need to consider running a zero-inflated model? Additionally, why are there 303 hours and 235 observations? Are observation periods only one hour?   
  
L326: "Foraging instance frequency and total floral visitation" Can you remind the reader what these two metrics are again? It was difficult to remember what you meant by foraging instance frequency. You could put the exact definition in parentheses after you mention it at the start of your results.   
  
L326: You haven't mentioned Table A1 yet. I would switch Table A2 so it becomes before Table A1 if you going to mention it first. It might be clearer to the reader that you are referring to Table A1 and not figure A1 if you write (Tables 1 and A1). The end of table A2 caption is cut-off.   
  
L338: "The frequency of foraging instances and flower visits by Syrphids and solitary bees declined significantly with shrub blooming (Table 2)." After revisiting your table and reading this sentence, I am having trouble understanding what models you ran and what the interaction between RTU\*blooming means. I think you need to spend more time describing why you ran this model (which hypothesis are you testing) and what the results mean. Is blooming whether the shrub plant was pre-flower or flowering? Is this conflated with date?   
  
L342: You talk about floral visitation rate (flowers/hr) but I thought you said you didn't actually use visitation rate as a response in your methods.   
  
L345: "A total of 16209 grains of conspecific pollen and 1719 of heterospecific grains were recorded on M. glabrata stigma." First, do you mean stigmas? Second, I would report the mean and variation of conspecific and heterospecific grains. Did you notice high correlation of the number of conspecific and heterospecific grains among flowers in the same plant since you collected three stigmas?  
  
L346: What is the "nearby site?" Do you mean secondary site? It might be less confusing for the reader if you name these sites in the methods and refer to them throughout the paper.  
  
L354: "Shrub effects on plant community." I think the title here might be incorrect, as you go on to discuss the arthropod community in the first paragraph. Percent cover in the second, and then visitation rate in the third.  
  
L355: How many total hours were the pan traps out and how many total pan traps did you have?   
  
L356: "Arthropod abundance (Melyridae excluded) and richness were higher in the shrub microsite and both decreased with shrub blooming (Table 3)." Did shrub microsite and open abundance/richness decrease in the same way?   
  
L360: Do you mean table A5?  
  
L364 - 365: "Heterospecific annual floral density did not differ between shrub and open microsites, also declined with shrub blooming (Table 3)." Did heterospecific floral density decline once blooming of L. tridentata began blooming? Could it be correlated with other factors? Do you correct for species ID in the heterospecific counts?

Perhaps some of the heterospecific bloom periods are just ending at the same time L. tridentata begins. This may not necessarily be a causal relationship.   
  
L369: (Figure 3A, Appendix 1000). Always start describing your figures from the first one presented (Figure 1). Is "Appendix 1000" a mistake?   
  
L373 - 375: Floral abundance and shrub height (Pearson's  = 0.335, t = 2.6659, df = 56, p = 0.01002) were correlated; however, height was not a significant predictor of pollinator visitation (GLM: Est: 0.0054, χ2: 3.6066, p = 0.061). Did the best-fit model have both predictors in it?  
  
L376: floral visit should be floral visits  
  
L380: "Mean daytime temperatures were significantly lower (Figure 3, χ2:84.959, p <0.0001)" Figure 3 doesn't show these data at all. I think you mean Figure 1A; however, you should show the data that you specify in your results.  
  
L381 - 382: What is considered night? Did you subset the temperature data when the sun was out relative to when it was down? Or did you split day and night into twelve-hour increments? I think daytime data could be used in your pollinator visitation models.   
  
L386: I would be careful when using the term "net interaction theory." I don't know if this is a coined term and folks may not know what you mean by this. Could you remove the word "theory" and rephrase your sentence?  
  
L389: "facilitated annuals" Do you have evidence that these annuals are facilitated already? Or is this just an assumption?  
  
L389 - 390: "We hypothesized that facilitated annuals would experience a shift in their pollination mediated through the flowering of their beneficiary shrub." I think to actually test this hypothesis, you would need to manipulate flowering on the shrub and assess how this affects pollination. I don't think your observational data truly tests this hypothesis. Did you have other hypotheses going into this study?  
  
L391 - 394: "The phenological shift into blooming by L. tridentata intensified the negative interaction with the development of exploitation competition with M. glabrata at both microsites rather than shifting net relative outcomes into facilitation via the magnet species effect." This sentence is very difficult to understand. I would remove the phrase "development of exploitation competition." You did not find that M. glabrata plants closer to L. tridentata had fewer conspecific grains relative to those farther away, suggesting exploitative competition but doesn't mean that is necessarily happening.   
  
L404 - 406: "Pollinators showed a behavioural response to the increased floral resources of the foundation species L. tridentata thereby decreasing overall visitation and visit duration to the phytometer M. glabrata." How do you know the same pollinators visit both species? Could it be there are just fewer pollinators out visiting M. glabrata while species which pollinate L. tridentata are higher in abundance generally? Did you ever record a case when a pollinator switched between species on a foraging bout?  
  
L409 - 410: "Feral honeybees, Apis mellifera, were the most frequent floral visitors to L. tridentata but only visited M. glabrata prior to L. tridentata blooming. I don't think you actually described this in your results." It may be a good idea to do so!   
  
 L418: "1971)Mosquin 1971)" I think this is a mistake.   
  
L443- L445: "Competition between syrphids and other pollinators is understudied (Inouye et al. 2015), but competition between bee species is better known. Centris sp. bees were frequent visitors to L. tridentata flowers during this study." Try to be consistent and use past tense.   
  
L457 - 458: "In this study, facilitation in germination and early growth came at a potential net fitness cost via competition for pollination during reproductive life stages." Germination was never assessed nor discussed in this study.  
  
L473 - 475: You don't know if conspecific pollen deposition is a proxy for reproductive fitness. There are a few pathways by which conspecific pollen deposition may affect fitness. For example, (1) more conspecific pollen may lead to an increase in fitness, (2) more conspecific grains may not lead to higher fitness once the stigma is covered, and (3) higher conspecific grains could reduce fitness if the species is self-incompatible. Since you don't actually apply conspecific grains and assess how the number of grains influences fitness, I would be careful about the statement you are making in these lines.  
  
L495: Figure 1. Can you give each figure its own label (like 1A and 1B). It would help when you discuss it in the text. You also don't ever reference this figure in the text. Please be consistent and use either common names or scientific names of the pollinators. Additionally, please add some indication of whether there are significant differences between any of these pairs (shrub vs. open).  For example, you could use an asterisk or letters to indicate significance. Write out the full name of the dandelion.  
  
L500, Figure 2: Same comments as above re: significance, labeling. Please label your y-axis.   
  
L505: Figure 3: When you are describing what positive and negative numbers mean, you don't specify the species you are studying. Figure legends should be descriptive enough that a reader should be able to gather all of the information they need to interpret it from the caption and the figure itself. I also wouldn't combine data from different observation techniques into one figure. I understand that you are trying to find a way to show all of the effects of L. tridentata on M. glabrata, but because these metrics are so different it is very difficult to interpret this figure. I am not sure the best way to present your data other than breaking it up into sections.   
  
L514: Table 1 (and notes for all tables).   
\*       Please simply your numbers to just two or three past the decimal point. It is very difficult to read these tables with so many values past the decimal.   
\*       Some of the font in the table is different, please try to make it consistent.   
\*       Why are some of your coefficients missing (NA?)  
\*       Are these your best fit models or your full models? What does "NA" mean? For example, under total flower visits, heterospecific has all NAs. Does that mean it was not included in your model or did the model fail to converge?  
  
L520: What post-hoc test did you use?   
  
L812: You don't cite the authors of the "car" package in R nor do you mention using it in your methods.   
  
L818- 819: The table caption is incomplete.   
  
L821: "Table A3: Full models with RTU-specificity" After reading your paper, I am having trouble fully understanding what this means. Can you make this more clear?  
  
L828: Type 3 Wald's is not a complete sentence.  
  
L831: These are hard to interpret. I think these data would be best presented as a figure. You don't reference this table at all in your results section.  
  
L832: Do not capitalize blooming.   
  
I request that my review not be shared with any third party, as it is written exclusively for the American Naturalist's Editorial Board, authors, and fellow reviewers of this paper.  
  
[signed]  
Rebecca M. Dalton  
  
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx  
  
Reviewer #2:   
  
I request that my review not be shared with any third party, as it is written exclusively for the American Naturalist's Editorial Board, authors, and fellow reviewers of this paper.  
  
This study system presents a good opportunity to study potential the potential fitness consequences that arise from plant interactions. The value of facilitation to understory annuals by creosote is a popular example of this interactions, however, the long term fitness consequences and complexity of this interaction is not often considered. Through pollinators it is possible to identify a mechanism by which exploitative competition might reduce a heterospecific species' fitness.   
  
There are some details and methodology that is hard to follow resulting in the sampling/surveying strategy not being easily visualized or udnerstood. Something as basic as the description of what the Open Site consisted of would go a long way to being able to accurately ascertain the functional units being compared. Similarly, it is not always clear what data is going into models or where it is coming from as there is diversity data recorded in both video surveying as well as in pant-traps. This problem might be solved simply by some better organization or structuring of the methods and results. In many cases units are missing on figures, and the description of some variables Foraging Instance Rate is not clear, again making it difficult to understand what is being measured. Some experimental controls that might significantly affect the data are also missing, as well as discussion of floral resources and the relationship between the insects sampled with these resources. Does  
transplated M. glabrata differ in pollinator attractiveness relative to unhandled M. glabrata. Justification for these omissions are important to state in order to better understand the system.  
  
The pollen data is likely the most important in addressing the question of tradeoffs in the plant relationship being studied. However, it's inclusion seems like an afterthought during the discussion. The pollination biology of the plants in the study are also only superficially covered. Without knowing the importance of pollination or the potential role pollen limitation plays in long term fitness of M. glabrata it is impossible to ascertain whether the differences in pollination or pollen deposition between treatments play a role. In addition, there are many points regarding the fitness consequences of particular data trends, however, fitness is never measured requiring some sore of caveat for these statements in order to not mislead the reader.  
  
An important omission in this paper is the elaboration on how to properly finish the work, i.e. extend this research to measuring actual fitness consequences. Inclusion of this material would improve the delineation of where this manuscript fits into the body of literature.  
  
Most of these comments/questions and variations on these topics are annotated in the attached PDF to facilitate revision.

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