

**Q: Can too much rain cause a pecan tree not to fruit. my pecan tree last year did not produce any pecan nuts. and we had above average rain where I live in Ennis tx**

A: I did a quick Google search on this, and it looks like indeed, very wet conditions can limit pecan fruit production. I found the following on this website:

<http://www.aces.edu/dept/extcomm/specialty/pecans2.html>

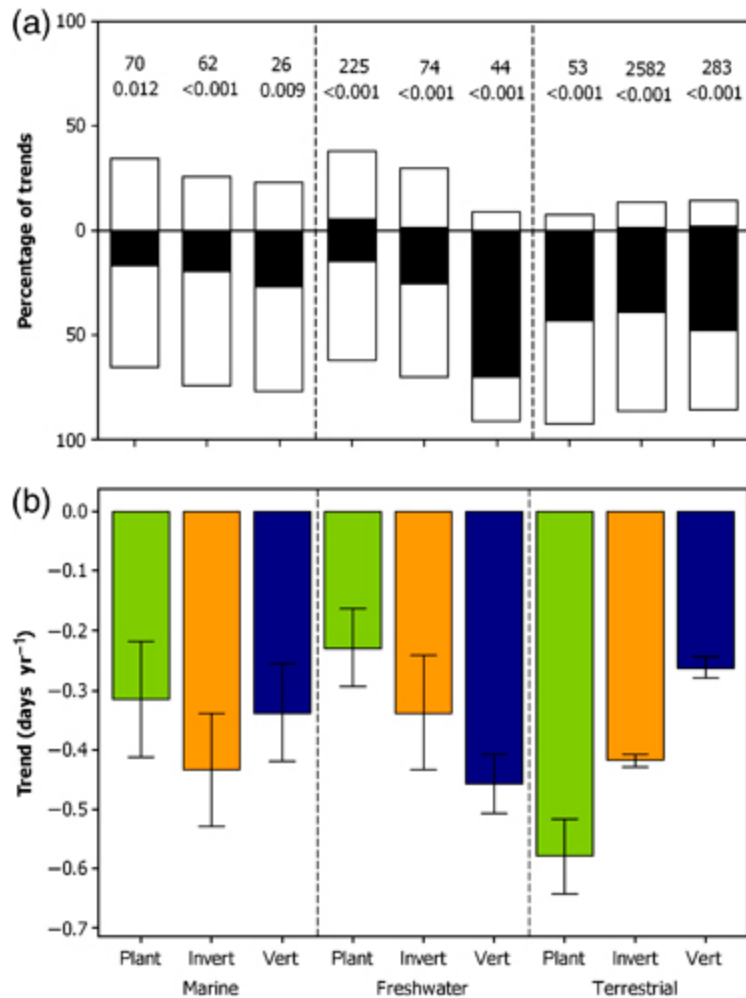
**“Too much or too little water-** Waterlogged soils where water stands do not provide aeration for roots. Lack of water, especially during dry periods of summer, frequently results in reduced yields and quality, and in weakened trees that may be less productive in following years. Choose well-drained soil, provide drainage for excess water and keep trees watered during dry periods.”

**Q: is there a difference between air, ground or water species and their change in phenology. Do any of them vary more than the other?**

A: The reference that comes to mind is this: The reference that jumped to my mind was this one:

Thackeray et al., 2010. “Trophic level asynchrony in rates of phenological change for marine, freshwater and terrestrial environments” *Global Change Biology* 16: 3304-3313.

In this study, the authors evaluated changes in phenology in plants, invertebrates, and vertebrates in marine, freshwater, and terrestrial species from across the UK. I don't think I can distribute the article widely (as it's not open-access), so I've copied the most relevant figure & caption:



Phenological change for the UK flora and fauna from 1976 to 2005. (a) percentages of advancing (below horizontal) and delaying (above horizontal) trends for each taxon–environment combination. Statistically significant advancing and delaying trends are indicated by black shading. Nonsignificant trends are indicated by white shading. The number of trends analysed for each taxon–environment combination (*n*) is given above each bar. Also shown is the significance level (*P*) of a two-tailed binomial test of the null hypothesis that negative and positive trends are equally likely. (b) Mean  $\pm$  SEM rates of change for plants/phytoplankton (plant; green bars), invertebrates (invert; yellow bars) and vertebrates (vert; blue bars) in marine, freshwater and terrestrial environments. All mean trends are negative, indicating an advance of phenological events. The taxa included in each taxonomic group–environment combination, and the number of trends per taxon, are given in supporting information, Table S3.

**Q: My question is regarding the red-eyed vireo migration tied to temperature. Is migration tied to the temperature of the vireo's winter home, or where it's migrating to?**

The red-eyed vireo graph was taken from this paper:

Hurlburt, A.H. and Z. Liang. 2012. "Spatiotemporal Variation in Avian Migration Phenology: Citizen Science Reveals Effects of Climate Change." PLoS ONE

<http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0031662>

This one is open-access, so you should be able to see the paper online.

This paper looked at shifts in bird arrival dates with increasing temperatures, and based on my read of it, it looks like they're looking at changes in temps in the breeding ground (where the bird is migrating to). I hope that helps!

**Q: Can we affect the migration of birds and animals by the poisons we put out to kill insects on plants and trees**

A: I'm really not up on the research on how pesticides can impact migration, but I did find this write-up that discusses ways in which birds and other animals are more broadly affected by chemicals:

<http://news.nationalgeographic.com/news/2014/07/140709-birds-insects-pesticides-insecticides-neonicotinoids-silent-spring/>

**Q: Can you tell us an american example of trophic levels becoming mismatched over time (similar to the European example)?**

A: Here is an example (which I realize is still not in the States), where Sandpiper breeding time is shifting differently than their insect food source. <http://climatechange.birdlife.org/current-threats/climate-change-disrupts-interactions-among-species/>