Data from:

Germination fitness of two temperate epiphytic ferns shifts under increasing temperatures and forest fragmentation

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Abstract

Ferns are an important component of ecosystems around the world. Studies of the impacts that global changes may have on ferns are scarce, yet emerging studies indicate that some species may be particularly sensitive to climate change. The lack of research in this subject is much more aggravated in the case of epiphytes, and especially those that live under temperate climates.

A mathematical model was developed for two temperate epiphytic ferns in order to predict potential impacts on spore germination kinetics, in response to different scenarios of global change, coming from increasing temperature and forest fragmentation. Our results show that an increasing temperature will have a negative impact over the populations of these temperate epiphytic ferns. Under unfragmented forests the germination percentage was comparatively less influenced than in fragmented patches. This study highlight that, in the long term, populations of the studied epiphytic temperate ferns may decline due to climate change. Overall, epiphytic fern communities will suffer changes in diversity, richness and dominance.

Our study draws attention to the role of ferns in epiphytic communities of temperate forests, emphasizing the importance of considering these plants in any conservation strategy. Derived from our results, it seems that it would be more practical to focus attention to forest conservation. From a methodological point of view, the model we propose could be easily used to dynamically monitor the status of ecosystems, allowing the quick prediction of possible future scenarios, which is a crucial issue in biodiversity conservation decision-making.

Keywords: *Asplenium*, bioindicators, epiphytic communities, germination kinetics, global change, predictive models, temperate forests

Methods

The following table shows germination percentage counted through an observational period of 39 days.

The experiments dealt with:

- Two species: *Asplenium dareoides* Desv. and *Asplenium trilobum* Cav.
- Two populations: P1: Chile, Región del Bío-Bío, Provincia de Concepción (36º47'S 73º09'W, 35 m); P2: Chile, Región de los Lagos, Provincia de Osorno (40º40'S 72º09'W, 465 m).
- Two temperatures: 13ºC and 17.5ºC.

For each species and population, 5 different sporophytes growing on different trees were collected, the spores mixed and sowed in petri dishes with mineral agar medium.

For each experiment, three replicates were made (samples 1.1-1.3 and 2.1-2.3).

Every three days, plates were observed under a compound microscope and proportion of germinated spores was counted looking at 100 spores randomly selected. Spores were marked as germinated when a rhizoid was evident.

SPECIES	SAMPLE (Pop./replicate)	TEMP. (ºC)	DAYS AFTER SOWING												
			3	6	9	12	15	18	21	24	27	30	33	36	39
A. dareoides	1.1	13.0	0.0	1.3	2.7	7.3	13.0	19.0	33.0	42.3	69.3	72.0	77.3	78.7	78.7
A. dareoides	1.2	13.0	0.0	1.3	2.7	7.3	13.0	19.0	33.0	42.3	69.3	72.0	77.3	78.7	78.7
A. dareoides	1.3	13.0	0.0	2.3	1.0	5.3	16.3	19.3	22.3	36.7	55.3	60.7	69.7	72.3	72.3
A. dareoides	1.1	17.5	0.0	0.7	1.7	5.0	8.7	10.7	28.0	39.0	42.3	58.3	63.3	63.3	63.3
A. dareoides	1.2	17.5	0.0	0.3	2.3	4.3	5.0	7.7	20.7	34.7	38.7	63.3	69.3	71.3	71.3
A. dareoides	1.3	17.5	0.0	0.3	1.0	4.0	9.0	12.7	22.3	36.7	55.3	60.7	66.0	68.0	68.3
A dareoides	2.1	13.0	1.3	3.7	10.0	24.3	35.7	56.0	78.0	80.0	83.3	84.3	88.7	91.0	91.3
A dareoides	2.2	13.0	2.3	5.0	14.3	24.7	32.3	39.7	58.3	67.3	73.7	80.3	84.3	88.7	88.7
A dareoides	2.3	13.0	1.7	6.3	13.0	17.0	20.7	30.3	48.7	71.0	73.3	84.7	87.3	90.7	90.7
A. dareoides	2.1	17.5	1.0	2.0	10.3	13.3	14.0	18.7	45.7	72.3	79.0	82.0	84.3	85.3	86.0
A. dareoides	2.2	17.5	0.7	2.0	7.3	14.3	17.3	21.7	52.3	82.0	87.3	88.3	89.0	90.3	90.3
A. dareoides	2.3	17.5	1.3	4.3	10.3	12.7	15.7	18.7	47.0	82.0	85.0	85.3	86.7	90.7	90.7
A. trilobum	1.1	13.0	0.0	0.0	2.0	4.0	7.0	9.3	24.0	37.3	45.7	55.3	60.0	60.0	60.0
A. trilobum	1.2	13.0	0.0	0.0	0.7	2.3	7.0	11.3	27.7	31.7	34.0	41.0	45.0	45.0	45.0
A. trilobum	1.3	13.0	0.0	0.0	1.3	3.7	7.3	13.0	16.7	24.3	28.3	42.0	50.0	51.0	51.0
A. trilobum	1.1	17.5	0.0	0.0	0.7	2.7	4.0	8.0	15.7	19.7	28.3	38.0	38.0	38.0	38.0
A. trilobum	1.2	17.5	0.0	0.0	1.0	2.7	4.7	8.7	14.7	19.0	26.0	39.3	39.3	39.3	39.3
A. trilobum	1.3	17.5	0.0	0.0	2.0	3.7	5.0	11.3	18.7	23.3	29.3	41.0	41.0	41.0	41.0
A. trilobum	2.1	13.0	0.0	0.7	4.3	6.3	11.3	22.0	50.0	61.0	68.7	68.7	68.7	68.7	68.7
A. trilobum	2.2	13.0	0.0	0.7	4.0	10.0	12.3	32.0	37.0	68.3	75.3	75.3	75.3	75.3	75.3
A. trilobum	2.3	13.0	0.0	1.0	5.3	27.3	33.3	44.7	48.7	51.0	70.0	70.0	65.0	70.0	70.0
A. trilobum	2.1	17.5	0.0	0.3	3.7	5.7	11.3	21.0	36.3	39.7	43.7	45.3	53.3	56.3	56.3
A. trilobum	2.2	17.5	0.0	0.0	1.3	4.7	9.0	22.3	47.7	49.0	51.0	55.0	58.7	64.3	64.3
A. trilobum	2.3	17.5	0.0	1.0	3.7	6.3	8.0	18.0	33.3	38.7	44.3	45.7	46.3	51.3	51.3