Articles to Expand Knowledge

"Temperature Fluctuations in a Warmer Environment: Impacts on Microbial Plankton."
Faculty Reviews vol. 10 9. 29 Jan. 2021, doi:10.12703/r/10-9
Cabrerizo, Marco J, and Emilio Marañón
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7894268/

Summary of significance: Cash crops like corn and soybeans are a large contributor to the economic success of the Midwest (Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin). Recent global climate change has had negative impacts on these specialty crops. As an example: between 2007 and 2012, in much of the Midwest, cold temperatures followed longer than average periods with warmer than average temperatures, which acted as a "false spring." Because of this, many of the perennial plants begin growing prematurely without time to fully germinate. Some farmers in Michigan and Ohio have since begun using high tunnel covers because of the rapid temperature fluctuation. These phenomenons in our home—the Midwest United States (Ohio)—were a large part of what inspired this experiment in the first place.

"Vulnerability of Specialty Crops to Short-term Climatic Variability and Adaptation Strategies in the Midwestern USA"
Erica Kristner, Olivia Kellner, Jeffrey Andresen, Dennis Todey, and Lois Wright Morton
https://link.springer.com/article/10.1007/s10584-017-2066-1

Summary of significance: This article analyzes the effects of drastic changes in temperature on the photosynthesis rate of phytoplankton. The team conducted a series of experiments that produced diverse results. Some reports indicated that temperature fluctuations slow the gross rate of photosynthesis. However, when the researchers used other species of phytoplankton, they found that temperature variability did not have any effect on photosynthetic activity. Therefore, they were able to conclude that photosynthetic plants or bacteria located in varying temperature environments (which tend to be closer towards the poles) are likely to be unaffected by drastic temperature changes, while the photosynthesis rate of species that reside in relatively constant environments is likely to be slowed from exposure to drastic temperature changes.

<u>Day 1 (Raw Data)</u> - “time checked” was limited by high school bell schedule

warm	**time checked**	**temp**	**color / pH**
trial 1	8:15	26 C	red / 8.3 pH
trial 2	9:22	26 C	purple / 8.8
trial 3	10:15	26 C	purple / 8.8
trial 4	11:11	26 C	purple / 8.9
trial 5	12:07	26 C	purple / 9.1
trial 6	12:44	26 C	purple / 9.1
trial 7	13:40	26 C	purple / 9.1
trial 8	14:32	26 C	purple / 9.1
trial 9	15:26	26 C	purple / 9.1

cold	**time checked**	**temp**	**color / pH**
trial 1	8:15	10 C	red / 8.3 pH
trial 2	9:22	10 C	red / 8.4
trial 3	10:15	7.5 C	red / 8.4
trial 4	11:11	7 C	red / 8.3
trial 5	12:07	7 C	reddish purple / 8.5
trial 6	12:44	7 C	reddish purple / 8.5
trial 7	13:40	7 C	purple 8.7
trial 8	14:32	8 C	purple / 8.7
trial 9	15:26	8 C	8.7

switched	**time checked**	**temp**	**color / pH**
trial 1	8:15	N/A	red / 8.3 pH
trial 2	9:22	26 C	purple / 8.8
trial 3	10:15	7.5 C	purple / 8.8

trial 4	11:11	26 C	purple / 8.9
trial 5	12:07	7 C	purple / 8.9
trial 6	12:44	26 C	purple / 9.1
trial 7	13:40	7 C	purple 9.1
trial 8	14:32	26 C	purple / 9.1
trial 9	15:26	7 C	purple / 9.1

Day 2 (Raw Data) - "time checked" was limited by high school bell schedule

warm	**time checked**	**temp**	**color / pH**
trial 1	7:54	23 C	orangey / 8.1 pH
trial 2	9:16	26 C	pinkish purple / 8.7
trial 3	10:06	26 C	neon purple / 8.9
trial 4	10:58	26 C	purple / 9.0
trial 5	11:41	26 C	purple / 9.1
trial 6	12:21	26 C	purple / 9.1
trial 7	13:00	26 C	purple / 9.1
trial 8	13:49	26 C	purple / 9.1
trial 9	14:37	26 C	purple / 9.1
trial 10	15:27	26 C	purple / 9.1

cold	**time checked**	**temp**	**color / pH**
trial 1	7:54	8 C	orangey / 8.1 pH
trial 2	9:16	8 C	orangey / 8.1
trial 3	10:06	8 C	orangey / 8.3
trial 4	10:58	8 C	orangey / 8.3
trial 5	11:41	8 C	orangey / 8.3

trial 6	12:21	8 C	orangey / 8.5
trial 7	13:00	8 C	orangey / 8.5
trial 8	13:49	8 C	reddish purple / 8.6
trial 9	14:37	8 C	reddish purple / 8.7
trial 10	15:27	8 C	reddish purple / 8.7

switched	**time checked**	**temp**	**color / pH**
trial 1	7:54	N/A	orangey / 8.1 pH
trial 2	9:16	8 C	reddish / 8.5
trial 3	10:06	26 C	kinda pinky / 8.7
trial 4	10:58	8 C	purpley / 8.9
trial 5	11:41	26 C	purple / 9.0
trial 6	12:21	8 C	purple / 9.1
trial 7	13:00	26 C	purple / 9.1
trial 8	13:49	8 C	purple / 9.1
trial 9	14:37	26 C	purple / 9.1
trial 10	15:27	8 C	purple / 9.1