Algae Town

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What is Algae Town?

Algae Town is an ongoing project that began four years ago when Dr. Stan Grove, Dave Slagel, students at Goshen College, and employees at Formco Inc. joined forces to research how to more efficiently grow and harvest microalgae.

What Are Our Goals?

Long term

- Be able to efficiently grow and harvest algae.

Short term

- Determine the source, mechanism, and how to best induce algal clumping.

- Research and stay up to date on new techniques being used in algae research.

- Find out more about the specific type of algae we are growing.

Summer Research

I began this summer knowing very little about what went on in the algae lab. My first couple of weeks consisted of learning basic techniques to keep the lab running smoothly and after I became accustomed to the way the algae lab worked, I started becoming more independent. The experiment that I focused on was determining the nutrient concentration that would grow algae the best.

Knowing the best nutrient concentration will help us learn more about the optimal conditions for our algae which will help us develop a more efficient growing process.

References

1. "Uses of Algae - Fertilizer, Energy Source, Pollution Control - Oilgae - Oil from Algae." Uses of Algae - Fertilizer, Energy Source, Pollution Control - Oilgae - Oil from Algae. Oilgae, Jan. 2013. Web. 20 June 2013. <http://www.oilgae.com/algae/use/use.html>.

2. Singleton, Bonnie. "Algae As a Food Source for Humans." Livestrong.com. Livestrong Foundation, 30 May 2011. Web. 20 June 2013. <http://www.livestrong.com/article/458681-algae-as-a-food-source-for-humans/>.

The Potential of Microalgae

Microalgae has the potential to be used for:

- **Fuel**
  - Algae can be used to make biodiesel, bioethanol, and biobutanol.
  - It also has the potential to produce vastly superior amounts of vegetable oil compared to terrestrial crops grown for the same purpose. [1](**Figure 1**)

- **Food**
  - Algae contains an abundance of vitamins, minerals, and trace elements.[1]
  - Algae also regulates blood sugar and digestion.

- **Pollution Control**
  - Wastewater treatment plants use algae to reduce their use of harsh chemicals.
  - Algae can be used to capture fertilizer runoff from farms.
  - Mass producing algae has the potential to drastically reduce CO_2 emissions.[1]

Other uses include:
- Agriculture
- Cosmetics
- Coloring
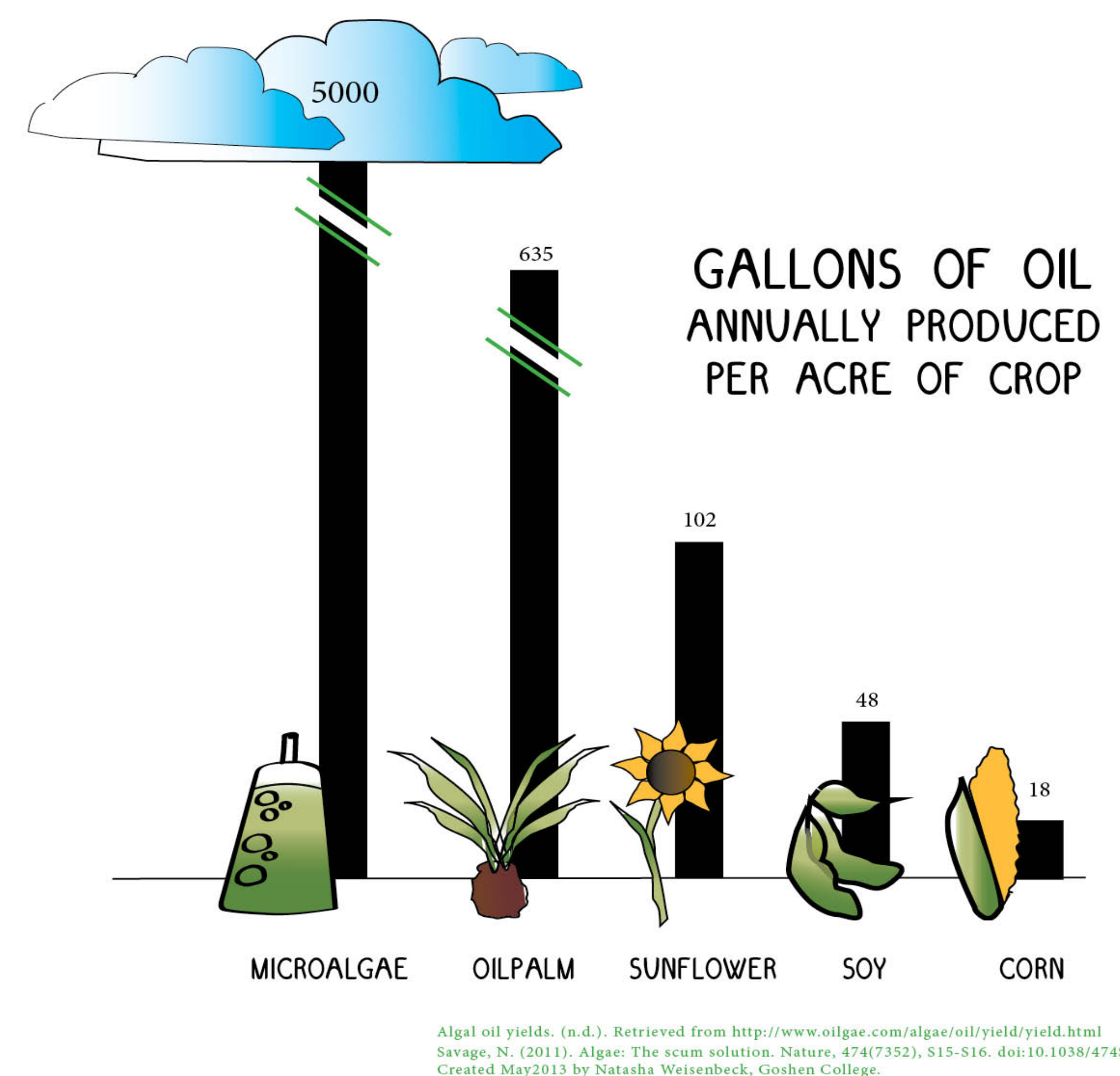- Weight Loss
- Batteries

Figure 1: The graph to the left shows the gallons of oil annually produced per acre of several different crops.

Determining the Most Effective Nutrient concentration

Method:

I began by filling two 5 liter bottles with 3 liters of media. The media in one bottle was diluted to ½ of the original concentration and the other was 1/10 of the original concentration. I then added 375 ml of algae to each 5L bottle. When that was done I had to transfer the liquid from the 5L bottle to a 3L bioreactor for easy harvesting. This process can be seen in **Figure 2.** After the transfer was complete I placed each bottle on a magnetic stirrer in order to keep the algae suspended. (**Figure 3**)

I proceeded to take 100ml samples every other day and record the turbidity, PCV, and dry weight of the sample.

Figure 2: By blowing air from an air valve into the 5L bottle, we were able to force the liquid out of the 5L bottle and into the 3L bioreactor.

Figure 3: The 3L bioreactors were placed on magnetic stirrers to keep the algae suspended.

Results and Discussion

I found that the turbidity of the two samples began at slightly different levels, but as time progressed, the turbidity between the two cultures was virtually the same. This can be seen in **Figure 4**.

In **Figures 5 & 6** there is a gradual upward trend in both graphs but the data is fairly inconsistent. This means that our method of measuring pack cell volume (PCV) and dry weight may need to be revised in order to get more consistent results.
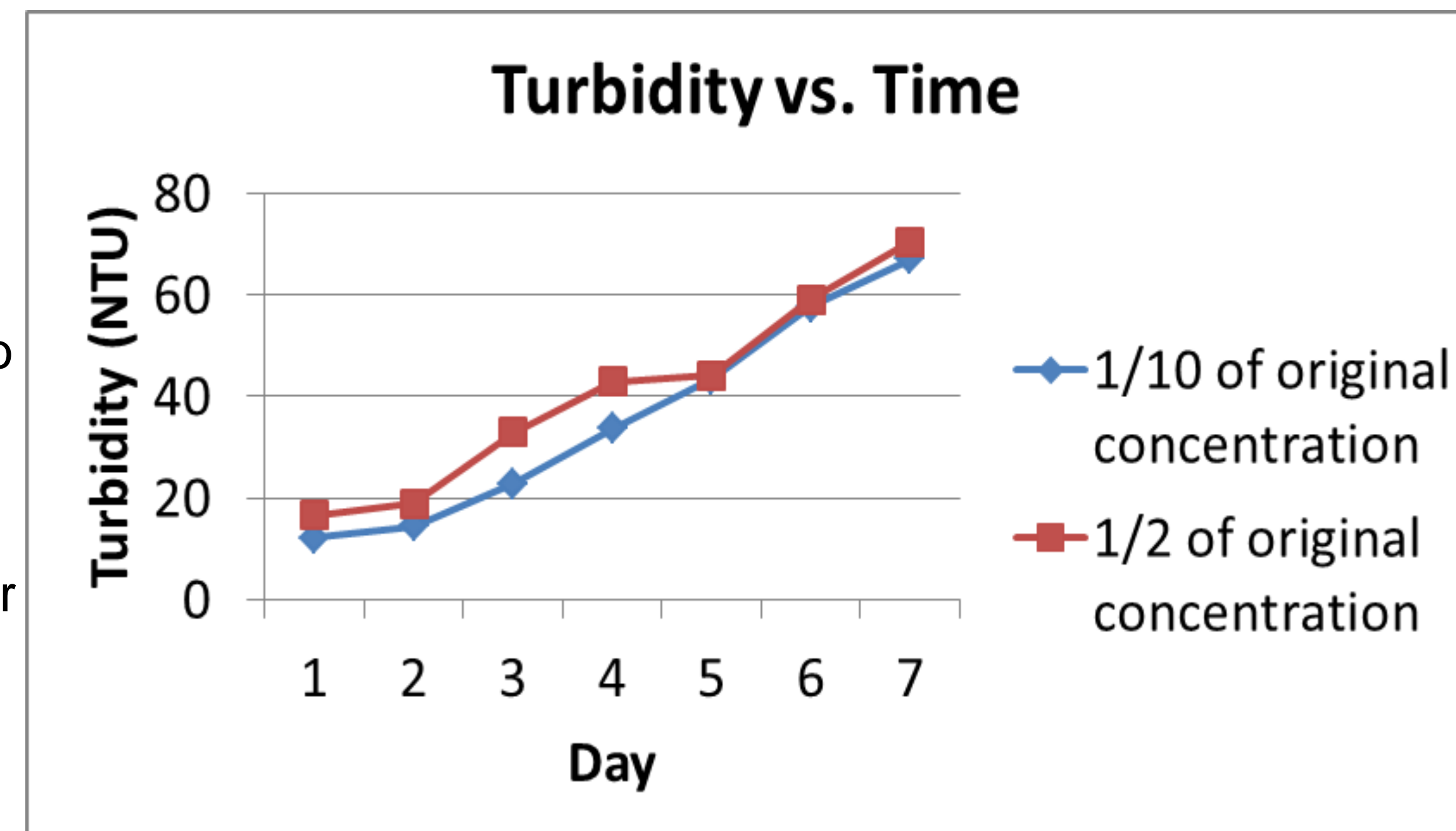
Figure 4: The graph to the right displays the change in turbidity over time.
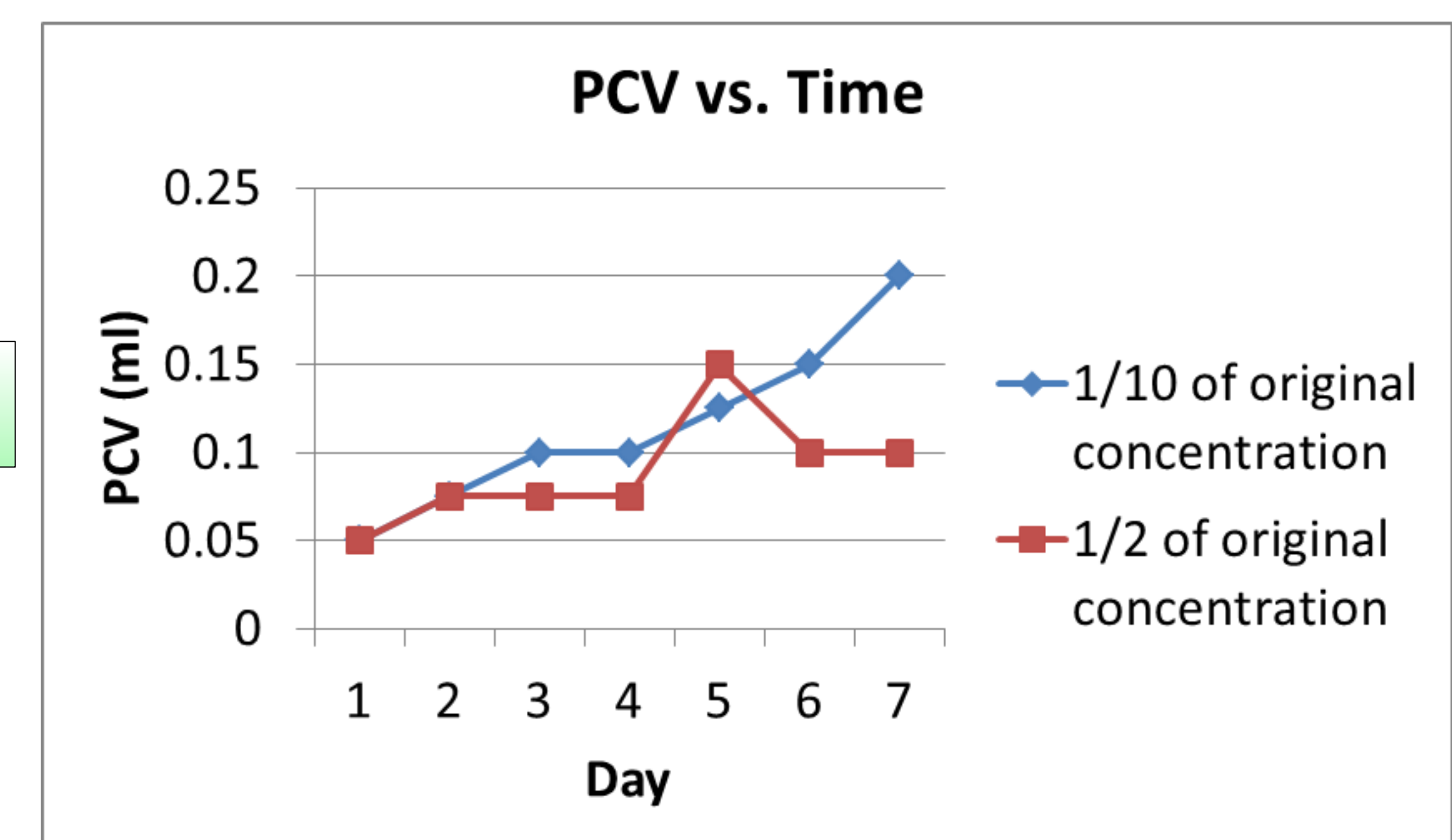

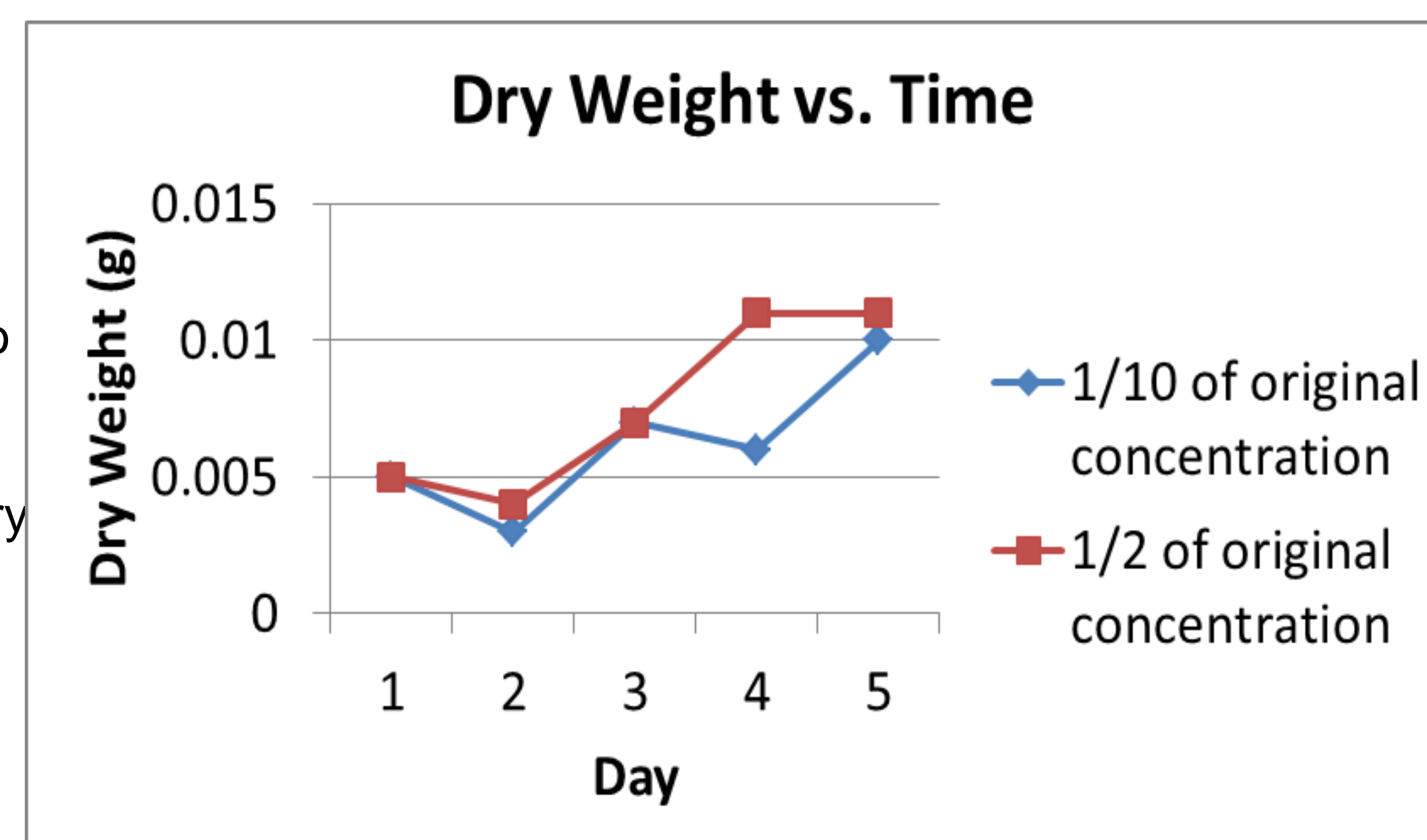**Figure 5:** The graph to the left displays the change in PCV over time.

Figure 6: The figure to the right displays the change in dry weight over time.