**Runoff We Can Change: California Tule and California Milkweed as Natural Filters**

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**Introduction**

Watsonville is a community primarily based on agriculture and with agriculture come big problems. Farms adding excess amounts of fertilizers like nitrates and phosphates can have harmful effects on the wetlands surrounding the agricultural fields and its aquatic organisms. Agricultural runoff is a problem that our community is facing. Agricultural runoff can cause eutrophication, which can lead to the disappearance of some wetlands and the aquatic organisms that live in the water because it increases algae blooms and decreases the oxygen level. For that matter we decided to base our W.A.T.C.H. project on testing California Tule and California Milkweed, to see which one acts as a better natural filter in reducing the amounts of nitrates and phosphates in the water. We believe that the California Tule will act as a better filter because its roots are always covered in water unlike the California Milkweed which can stand dry soil. We hope that by conducting this experiment we will be able to figure out which plant is the better natural filter and eventually plant more of that plant near a wetland so it could minimize the amount of nitrates and phosphates that enter the wetland.

**Materials**

- 5 California Tule (alive)
- 5 California Milkweed (alive)
- Nitrate Testing kit (Chemetrics)
- Phosphate testing kit (Chemetrics)
- 10 round trays (about the same size)
- 10 cylinder pots
- 2 big pots
- 500ml cylinder

**Methods**

Prepare the plants and collect the water from a slough that would contain agricultural runoff, for our experiment we collected water from the slough at the Watsonville Slough Nature Reserve. We then planted the California Tule and California Milkweed and potted in sand and bark. We then water all the California Tule plants and collect the water that was absorbed. We then repeated the process for the California Milkweed.

**How to Compare Results**

*In order to be able to compare the results of the two types of plants you need to follow a mathematical process:*  

**California Tule**

- You add the amount of nitrates that the water of the four plants contained
- You divide that answer by 5 because you added 5ml of nitrates
- The answer that you get would be the average amount of nitrates that the water of four California Tule plants will contain after 1ml of nitrate per 100ml of water are added.

**California Milkweed**

- You add the amount of nitrates that the water of the four plants contained
- You divide that answer by 3 because you added 3ml of nitrates
- The answer that you get would be the average amount of nitrates that the water of four California Milkweed plants will contain after 1ml of nitrate per 100ml of water are added.

**Tuesday Protocol:**

- Dump any water that is left in the trays.
- Water every plant and collect the first 500ml of runoff
- Test for nitrates and phosphates
- Write down your results and compare them every test day
- Check if there is any water in the pot that has bark to see if it is moist and if all of the water was absorbed.
- Test it 3 different times

**Conclusion**

By conducting this experiment we were able to figure out that California Tule is a better filter for filtering phosphates than California Milkweed. However California Milkweed is better at filtering nitrates than California Tule. In conclusion there was no real winner between the two plants. Our results showed that you need both plants in order to reduce the amount of nitrates and phosphates found in water; therefore our hypothesis was both wrong and correct which is a good thing. Our results suggest that there needs to be a diversity of plants in order to reduce agricultural runoff, and not just one. Planting filter strips around agricultural fields with a diversity of plants will reduce the amount of nutrients that enter the sloughs creating a healthier ecosystem. Our future helping plans will start by educating the whole freshman class in P.V.H.S. about agricultural runoff. We will be giving them a detailed presentation referring to our project trajectory and doing a simulation of agricultural runoff. We will also be participating in Earth Day and informing the community about the negative effects that agricultural runoff causes.

**Literature Cited**


**Acknowledgements**

Thomas Borden-P.V.H.S. health teacher
Mrs. Jones-Bilingual education specialist
Joanna Johnson-Communications coordinator for the Wild Farm Alliance
Mrs. Martinez-P.V.H.S. science teacher
Amy Kaplan-Feld staff from CAFF
Kim Swan-Teens program manager