

**HOS 3430C Nutrition of Horticultural Crops  
(3 credits)**

**Fall 2016**

**Lab Report**

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**Office hours:** by appointment

- **Format:** Writing rather than printing
- **Bonus:** High quality reports can be credited up to 10% of the total point value as bonus points
- **Redoes:** You have the opportunity to correct your lab report and can receive up to 50% of the points lost if the corrected report is turned in within two days
- **Late points:** 5 points for one day, 10 points for two days, 20 points for three days, **no points** will be credited after three days.

Date	Activity	Due	Full credit
<b>Lab</b>			<b>1000</b>
Aug 25	Lab 1 – Field tour	Aug 30	200
Sep 13	Lab 2 – Rhizosphere pH mapping	Sep 15	100
Sep 27	Lab 3 – Table of essential elements (take home)	Sep 29	100
Oct 13	Lab 4 – Practical calculations for nutrient rates (take home)	Oct 18	100
Oct 18	Lab 5 – Find your answers from EDIS	Oct 20	100
Oct 25	Lab 6 – Tour: ARL/ESTL - meet at Wallace Building #631 at 2390 Mowry Road at 1:45 PM	Oct 27	100
Nov 8	Lab 7 – Grow plants in aeroponics	Nov 10	100
Nov 22	Lab 8 – Fertigation in Citra	Nov 29	200

**HOS 3430C Nutrition of Horticultural Crops  
Report of Lab 1 (200 points)**

August 25, 2016

**Report due: August 30, 2016**

**Field tour report**

**Objective:** See/understand real fertilizers and plants.

**Approach:** Field tour.

**Required materials:** Notebook and cellphone camera.

**Grading:** On the quality/creativity of your field tour report.

**Report:**

1. Select 3 topics related to nutrient management or plant nutrition that will be addressed during the tour.
2. Report:
  - List five of fertilizers, container-grown plants you see
  - The most striking point you learned
  - What can we improve for next field tour?

**HOS 3430C Nutrition of Horticultural Crops  
Report of Lab 2 (100 points)**

September 13, 2016

**Report due: September 15, 2016**

**Effect of N form on the rhizosphere pH**  
(TAs will complete steps 1 to 7 due to time limitation)

**Objective:** Understand the relationship between pH changes in the root zone and nutrient uptake.

**Approach:** Trials in root boxes.

**Required materials:** Chemicals, root boxes, plants, etc. Please see the protocol below for details.

**Grading:** On the quality/creativity of your lab report.

- **Rhizosphere *acidification* by ammonium N**

1. Prepare 100 ml 5.8 M  $(\text{NH}_4)_2\text{SO}_4$ , 100ml 1 M  $\text{CaCl}_2$
2. Take 1 ml each of the above solution and dilute to 1000 ml
3. Use 0.1 N HCl or NaOH to adjust pH to 6.8 of the above solution (2)
4. Take 150 ml pH 6.8 solution and add 1.3 g (0.9%, w/w) agar into it
5. Dissolve 12 mg pH indicator, Bromocresol purple (BP) in 5 ml DI water
6. Microwave 150 ml of the pH 6.8 solution to boil
7. Add the BP solution into the boiled solution (6) (solution should be purplish)
8. Cool the solution (7) to 45°C
9. Carefully lay the seedling roots onto to the root box
10. Pour the 45°C solution into the root box
11. Use Cling Wrap film to cover the surface of the root box from one side to the other, avoid any air bubbles
12. Cover the root box with aluminum foil to keep light from roots
13. Watch the color change in the rhizosphere

- **Rhizosphere *alkalinization* by nitrate N**

1. Prepare 100 ml 5.8 M  $\text{NaNO}_3$ , 100ml 1 M  $\text{CaCl}_2$
2. Take 1 ml each of the above solution and dilute to 1000 ml
3. Use 0.1 N HCl or NaOH to adjust pH to 5.0 of the above solution (2)
4. Take 150 ml pH 5 solution and add 1.3 g (0.9%, w/w) agar into it
5. Dissolve 12 mg pH indicator, Bromocresol purple (BP) in 5 ml DI water
6. Microwave 150 ml of the pH 5.0 solution to boil

7. Add the BP solution into the boiled solution (6) (solution should be yellowish)
8. Cool the solution (7) to 45°C
9. Carefully lay the seedling roots onto to the root box
10. Pour the 45°C solution into the root box
11. Use Cling Wrap film to cover the surface of the root box from one side to the other, avoid any air bubbles
12. Cover the root box with aluminum foil to keep light from roots
13. Watch the color change in the rhizosphere

P.S. Put the roots of the plant in a 0.1 mM CaCl<sub>2</sub> solution for two days prior to the trial to get the better results.

**Report:**

1. What do you see?
2. Why does the rhizosphere pH change?
3. How would you improve this experiment?

**HOS 3430C Nutrition of Horticultural Crops**  
**Report of Lab 3 (100 points)**

September 27, 2016

**Report due: September 29, 2016**

**Objective:** Understand the functions of nutrient elements essential for plant growth and development.

**Approach:** Reading and summarizing.

**Required materials:** Notebook.

**Grading:** On the quality/creativity of your table of essential elements.

**Report:** Develop and fill in a table with essential elements in rows and the following categories in columns:

**Table of essential elements**

- Natural nutrient source
- Fertilizer source
- Concentration range in plant
- Concentration range in soil
- Form(s) absorbed
- Uptake mechanism
- Main functions
- Mobility in plant (+,-,0)
- Mobility in soil (+,-,0)
- Deficiency symptoms
- Others you can think of

**HOS 3430C Nutrition of Horticultural Crops  
Report of Lab 4 (100 points)**

October 13, 2016

**Report due: October 18, 2016**

**Practical calculations for nutrient rates**

**Objective:** Be able to formulate a target nutrient solution from individual fertilizer salts.

**Approach:** You will be presented with a water quality analysis, target final fertilizer concentrations of each essential nutrient, and a spreadsheet tool. The task is to enter these water quality values into the spreadsheet, select appropriate fertilizer salts, decide which tank to mix them into to avoid precipitation reactions, and calculate the quantity of each fertilizer salt needed in order to achieve the desired final nutrient solution. This is a take-home project.

**Required materials:** You will need access to a computer with a copy of Microsoft Excel.

**Grading:** You will be graded on achieving the target ppm of each essential nutrient, while following guidelines that avoid problems such as precipitation reactions.

**Report:** your calculations on

1. water quality analysis
2. final fertilizer concentrations of each essential nutrient/the quantity of each fertilizer
3. summarize what you learn from this lab session
4. nutrient concentrations to avoid precipitation

**HOS 3430C Nutrition of Horticultural Crops  
Report of Lab 5 (100 points)**

October 18, 2016

**Report due: October 20, 2016**

**Finding your answer from EDIS publications**

**Objective:** Learn how to find solutions for crop production from EDIS publications

**Approach:** Reading and summarizing.

**Required materials:** Laptop and Notebook.

**Grading:** On the quality/creativity of your report.

**Report:** How and what you find from the EDIS publications:

1. Please form five questions related to nutrient management of crop production: e.g., what is N-sure? What is a chelated fertilizer? Then search your answers from EDIS.
2. Your report needs to include:
  - List the topics you were interested in
  - Key words used for your search?
  - The answer to each of your questions?

**HOS 3430C Nutrition of Horticultural Crops  
Report of Lab 6 (100 points)**

October 25, 2016

**Report due: October 27, 2016**

**Tour: ARL/ESTL - meet at Wallace Building at 2390 Mowry Road**

**Objective:** Understand soil testing for BMPs

**Approach:** Visit ARL/ESTL.

**Required materials:** Laptop and Notebook.

**Grading:** on the quality/creativity of your report.

**Report:**

1. Select 3 topics related to methodology, equipment, or services presented at the ARL labs
2. **It should include:**
  - The topics presented
  - Three instruments demonstrated
  - What instruments are used for NPK analyses
  - What you learned about nutrient management
  - The most striking point with regard to nutrient management



**HOS 3430C Nutrition of Horticultural Crops  
Report of Lab 7 (100 points)**

November 8, 2016

**Report due: November 10, 2016**

**Growing plants in aeroponics**

**Objective:** Be able to build up an aeroponics system and grow plants in the system

**Approach:** Lab trial.

**Required materials:** Water pumps, containers, bottles, tubing, nozzles and baskets

**Grading:** On your understanding to plant growth in mist culture and the quality/creativity of your report.

**Report:**

- What factors affect plant growth?
- How do you provide nutrients to plants?
- How do you provide oxygen to plants?
- What are the differences between aeroponics and hydroponics?

**HOS 3430C Nutrition of Horticultural Crops**  
**Report of Lab 8 (200 points)**

November 22, 2016

**Report due: November 29, 2016**

**Fertigation** at the UF/IFAS Plant Science Research & Education Unit  
2556 West Highway 318, Citra, Florida 32113

**Objective:** Understand fertigation

**Approach:** Visit the UF/IFAS research farm in Citra.

**Required materials:** Notebook.

**Grading:** On the quality/creativity of your report.

**Report:**

- What components does the fertigation facility have?
- How can we fertigate blueberry plants at different N rates?
- How can we acidify the soil?
- What are your suggestions for improving the system?