

Agry 515

## Plant Mineral Nutrition

*Fall 2012*

### General Information

**TIME/LOCATION:**

Tuesdays and Thursdays, noon to 1:15 PM, Lilly 3-102.

**COURSE WEBSITE:**

<http://www.agry.purdue.edu/courses/agry515/agry515.htm>

**COURSE GOALS:**

To understand the principles of plant nutrition of higher plants based on our current knowledge and to understand how the subject area relates to other, closely related disciplines such as physiology, soil science and biochemistry. Specific topics include: nutrient availability in the soil, nutrient uptake and distribution in plants, nutrient functions in the plant and contributions to growth and yield, modeling nutrient accumulation to test the current understanding of mechanisms, root modification of the soil environment and ecological and genetic aspects of mineral nutrition.

**BASIC COURSE OUTLINE:**

- I. Introduction to plant nutrition: definitions and classification, nutritional physiology, yield response, experimental methods (1.5 lecture\*).
- II. Soil nutrient supply: plant available nutrient pools, soil supply processes, nutrient movement in soils, root system morphology, root induced changes in the soil environment (4 lectures).
- III. Absorption and transport of mineral nutrients in plants: ion uptake, short and long distance transport in the plant, phloem mobility (4 lectures).
- IV. Assimilation and functions of mineral nutrients in plant metabolism: macronutrients, biological N fixation, micronutrients, beneficial elements, and symptom diagnosis of deficiency (8 lectures).
- V. Modeling nutrient accumulation: testing the current understanding of mechanisms (2 lectures)
- VI. Ecological and genetic aspects of mineral nutrition: disease resistance, life in the rhizosphere, genetic variation in nutrient acquisition and use, competition for nutrients, adaptation to deficiencies and toxicities (5 lectures).
- VII. Current Topics (2 lectures).

*\*Number of lectures assigned to a topic is tentative. The course will be adjusted to accommodate student knowledge level.*

### COURSE FORMAT:

Two 75 minute lectures per week. Open discussion of lecture topics and related homework problem sets is an integral part of each class session. Students are graded on problem sets (3) and midterm exams (2). The final exam may be optional and, if given, will account for 30% of your grade. Quizzes used at the discretion of the instructor. Assigned reading will be in the course text or in provided handouts. *This is a 3 credit course.*

### OFFICE HOURS:

By arrangement.

### INSTRUCTOR:

Sylvie Brouder  
Office: 3351 Lilly Hall  
Tel.: 49-61489  
email: sbrouder@purdue.edu

### STUDENT EVALUATION:

	Option 1	Option 2
Problem Sets 1 and 2	15% each	10.5% each
Problem Set 3	30%	21%
Midterms (2)	20% each	14% each
Final	NA	30%

### GRADING SCALE:

A+/A	≥ 93%
A-	90% to < 93%
B+	88% to < 90%
B	83% to < 88%
B-	80% to < 83%
C+	78% to < 80%
C	73% to < 78%
C-	70% to < 73%
D+	68% to < 70%
D	63% to < 68%
D-	60% to < 63%
F	<60%

**MISSING EXAMS / LATE HAND-INS:** Without prior approval there will be no makeup exams and late hand-ins will not be accepted.

**ACADEMIC HONESTY:** We are committed to the principles of academic honesty and expect each student to maintain a high standard of academic integrity. Our commitment to you, the student, is to provide a learning environment that promotes academic honesty in and out of the classroom. We support the Purdue University policy concerning academic honesty. Consequently, any student involved in an academically dishonest act will be given an F in class and the action will be reported immediately to the Dean of Students. (For more info.: <http://www.purdue.edu/univregs/studentconduct/index.html>)

TEXT:

Marschner, P. 2012. Mineral Nutrition of Higher Plants (3<sup>rd</sup> Ed.). Academic Press, London.

ADDITIONAL REFERENCES:

Barber, S.A. 1995. Soil Nutrient Bioavailability. Wiley, New York.

Barber, S.A. and D.R. Bouldin (Eds.) 1984. Roots, Nutrient and Water Influx, and Plant Growth. ASA Special Publication Number 49, Soil Science Society of America, Madison, WI.

Bennett, W.F. 1993. Nutrient Deficiencies and Toxicities in Crop Plants. APS Press, St. Paul, MN.

Connor, D.J., R.S. Loomis, and K.G. Cassman. 2011. Crop Ecology: Productivity and Management in Agricultural Systems (2<sup>nd</sup> Ed.). Cambridge Univ. Press, Cambridge, UK.

Epstein, E. and A.J. Bloom. 2005. Mineral Nutrition of Plants: Principles and Perspectives (2<sup>nd</sup> ed.). Sinauer Associates, Inc., Massachusetts.

Gianinazzi, S. and Schuepp, H. 1994. Impact of Arbuscular Mycorrhizas on Sustainable Agriculture and Natural Ecosystems. Birkhauser Verlag. Basel, Switzerland.

Larcher, W. 1995. Physiological Plant Ecology. (3<sup>rd</sup> Ed..) Springer Verlag. New York.

Taiz, L. and E. Zeiger. 2006. Plant Physiology. (4<sup>th</sup> Ed..) Sinauer Associates, Inc., Massachusetts.

Waisel, Y., Eshel, A. and Kafkafi, U. 1996. Plant Roots: The Hidden Half. (2<sup>nd</sup> Ed.). Marcel Dekker, New York.

In Case of Campus Emergency:

In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances. To obtain information on any changes in AGRY 515, please email me at [sbrouder@purdue.edu](mailto:sbrouder@purdue.edu) or call my office phone; 496-1489. I will post any changes to the course website as soon as it is possible to do so; if I have access to your email addresses, I will email any changes directly to you.