

Plant Propagation

Basic Course Information

Course Name: HORT 260-001; Plant Propagation

Meeting/Time/Location: Lecture—Shepardson 212, MWF 11:00 a.m.-11:50 a.m.

Lab Sections—Room 113, Plant Growth Facilities; Tuesday
Noon-1:40 p.m. and 2 p.m.-3:40 p.m.

Course Description: Theories, principles, and techniques of sexual and asexual propagation.

Credits: 4

Prerequisite: BZ 120, may be taken concurrently or HORT 100, may be taken concurrently or LIFE 103, may be taken concurrently.

Registration Information: Must register for lecture and laboratory.

Semester: Spring 2018

Instructor Information

Lecture Instructor: Dr. Tamla Blunt; tamla.blunt@colostate.edu

Lab Instructor: Brian Mitchell; brian.mitchell@colostate.edu

Undergraduate Lab TA: David McKinney; david.mckinney@colostate.edu

Office Phone: 970-491-7498

Office Hours and Location: C027 Plant Sciences Bldg; Wednesdays 2:30-3:30 p.m. or by appointment

Course Materials

REQUIRED TEXTS:

- Plant Propagation; Concepts and Laboratory Exercises, 2nd Edition. Edited by Caula A. Beyl and Robert N. Trigiano; CRC Press; 2008; ISBN 978-1-4665-0387-8

RECOMMENDED BUT NOT REQUIRED

- The Plant Propagator's Bible. Miranda Smith; Rodale Books, Inc.; 2007
- Hartmann & Kester's Plant Propagation: Principles and Practices 8th Edition; Hudson T. Hartmann, Dale E. Kester, Fred E. Davies and Robert Geneve; Prentice Hall; ISBN 978-0-13-501449-3

Course Overview

1. Discuss the goals and duties of a professional plant propagator.
2. Discuss and explain intellectual property rights in a plant propagation context (i.e. what constitutes intellectual property, how intellectual property rights are protected and how those protections would affect a commercial plant propagator's work).
3. Demonstrate and explain seed propagation (including seed harvesting and cleaning, seed storage practices, viability testing methods, seed certification, seed dormancy mechanisms and the pre-germination conditioning methods used to alleviate seed dormancy, seed sowing techniques, stages of seedling development, and the factors that impact seed quality and germination).
4. Demonstrate an understanding of vegetative propagation methods (i.e. Propagation by shoot and root cutting, division, layering, specialize structures, grafting and budding, micropropagation etc; common variations of each methodology (ex. the various types of layering) and the reasons why a particular methodology might be used to propagate a particular crop).
5. Discuss and explain the attributes of the propagation container and propagation substrates that are critical to propagule survival or salability.
6. Discuss and explain integrated pest management in the plant propagation environment (i.e. identification of important pathogens, the role of sanitation in preventing disease transmission, etc).
7. Discuss and explain the occupational safety concerns (i.e. safe handling of pesticides, alleviating repetitive motion, etc) found in the plant propagation work environment and compliance with regulations concerning those safety concerns.
8. Compare the functions of irrigation, mist, and fog in plant propagation.
9. Demonstrate an understanding of the importance of trueness-to-variety, totipotency, topophysis, periphysis and cyclophysis to plant propagation.

10. Discuss (1) the differences between cultivars that arise from sexual union and those that arise from bud-sports and chimeras (2) the differences between cultivars of a species and subspecific variants of a species and (3) how these differences would affect propagation.

11. Demonstrate an understanding of the scientific method and its application to plant propagation research.

12. Write a plant propagation protocol for (1) a woody ornamental and (2) an annual or herbaceous ornamental. Information on what to include in your paper will be posted on Canvas.

13. Recognize and explain that it is the professional knowledge and skill set an individual brings to propagation work that is likely to determine success rates and profitability in propagation; not facilities alone.

Grading

Quizzes: Will cover materials presented in lecture/lab and the reading. Quizzes will be (mostly) weekly, either posted Friday afternoon after class on Canvas and available until Sunday night at 11:59 p.m. **OR** given during the class period. You will have until Sunday at 11:59 p.m. to complete the quiz if it is online; the online quizzes will cover any material **presented in lecture and lab** during that week. Quizzes will not be cumulative, but questions may be asked again if it appears that the material is not understood.

Experiment Journal: There will be an experiment journal required for most of the lab exercises that are done in lab sessions. This will be due Tuesday, May 1, 2018. The experiment journal will be available on Canvas for you to download. You can type in your data to the experiment journal (the boxes will expand as you type) and either print a copy to turn in during class or email it to me or Brian. **NO HANDWRITTEN JOURNALS WILL BE ACCEPTED FOR GRADING.** A reminder that this is a significant portion of your grade (approximately a third of the total class grade).

Propagation Protocols: You will be required to research the propagation of two commercially produced horticultural crops and submit a written protocol for producing the crop. The only crop/plant you are **NOT** allowed to use for a propagation protocol is Cannabis. The first protocol will be due Friday, March 9th, 2018. The second protocol will be due Friday, April 27th, 2018. Assignments will have 10 points deducted for each day past the due date that assignments are late. There is an outline posted on Canvas for you to use as a guide. Protocols turned in must use Microsoft Word or Adobe PDF. No powerpoints will be accepted. The grading rubric will also be posted on Canvas.

Activities	Contribution to Overall Grade
Quizzes	500 pts.
Papers	200 pts.
Lab Projects/Experiment Journal/Quizzes	300 pts.
TOTAL	1000 pts.

Grading Scales and Standards

- The instructors will make every attempt to return all assignments in a timely manner.
- Your percent score for the course is rounded up to the next whole number when a final grade is assigned.
- To qualify for an incomplete grade in this course, the student must request an incomplete from the instructor prior to the last class meeting, and must have completed at least 75% of the course requirements with a C or better. An incomplete grade may result in the suspension of financial aid the next semester.
- Final grade is posted to Aries 5-10 working days after the semester ends.
- Unreturned/unclaimed assignments are held for one semester; then destroyed.
- No extra credit work will be given by the instructor for this course.
- Attendance and participation will be considered in grading only in borderline cases.

Letter Grade	Range
A	90 – 100%
B	80 – 89%
C	70 – 79%
D	60 – 69%
F	59% and lower

Late Policy

Make-up Quizzes

Make-up quizzes/exams are at the Instructor's discretion. If you know in advance that you will be missing an exam because of work, or, if unusual circumstance or illness precludes your taking an exam/quiz at the scheduled time, please make arrangements with the instructor concerning a make-up quiz/exam. Assignments (including quizzes/exams) are due on or before the "due date" stated on the assignment. If you know you are going to be absent the day an assignment is due, please turn it in prior to your absence, email it to the instructor, or arrange (with the instructor) to turn it in upon your return. If you are ill the day an assignment is due, it must be turned in at the start of class the day you return.

Attendance and Participation

Attendance:

Your attendance and participation is essential to your learning this material. You are expected to attend each class session, be on time, and stay for the entire session. Students arriving to class late or departing early should remember to keep any disruptions to a minimum. Remember that these disruptions are unfair to the other students and may interfere with their learning. Attendance will be taken at each session as required by the Department. Your attendance and participation will be a factor in allowing makeup or extra credit work should the need arise. **Makeup quizzes/exams will be at the instructor's discretion.** We all have experiences that will improve this class and each other's understanding of the materials discussed in this class. Please share those experiences.

Academic Honesty

Students are expected to uphold CSU's Student Code of Conduct relating to academic honesty and assume full responsibility for the content and integrity of the academic work they submit. The guiding principle of academic integrity will be that a student's submitted work, examinations, reports, discussions, and projects must be that of the student's own work and unique to the course. Students are guilty of violating the honor code if they:

- Represent the work of others as their own (this includes copying material from the Internet for discussion postings or other assignments without proper citation)
- Use or obtain unauthorized assistance in any academic work.
- Give unauthorized assistance to other students.
- Modify, without instructor approval, an examination, paper, record, or report for the purpose of obtaining additional credit.
- Misrepresent the content of submitted work.
- The penalty for violating the honor code is severe. Any student violating the honor code is subject to receive a failing grade for the course and will be reported to the Office of Student Affairs. If a student is unclear about whether a particular situation may constitute an honor code violation, the student should contact the instructor to discuss the situation.

Collaboration. Unless otherwise instructed, all work submitted is to be done individually by the student. This means you should not be working in pairs or in a group to write discussion posts, complete assignments or take quizzes and other assessments unless specifically asked to do so by your instructor.

Plagiarism / Dual Submission. Plagiarism, whether intentional or accidental, is academic dishonesty and may incur disciplinary action ranging from receiving a zero on an assignment or failing a course to more severe consequences. Plagiarism means:

- Using someone else's ideas and not correctly citing that use. This means that if you put someone else's work into your own words, put it in your work, and do not correctly document it, the idea is plagiarized.
- Using someone else's words without quotation marks and not correctly citing that use.

- Using someone else’s images or other works (such as from the Internet) without correctly citing that use.
- Submitting work that has been turned in for credit in another class or at another institution unless specifically permitted by your instructor.
- Students may be required to submit work that is evaluated for originality by Turnitin.com, a plagiarism detection software program that checks for certain forms of plagiarism.

In summary, students are expected to come to class prepared to learn, question, and actively participate in the class activities. They are expected to complete assignments in a timely and professional manner, and to be courteous to the instructor and fellow students (**this includes turning off cell phones!**). In return, the instructor will work to provide a respect filled environment in which every student can learn. The instructor will also try to give students timely and professional feedback (including graded assignments) and assistance in their learning.

Important Dates:

Jan. 16, 2018	Classes begin
Jan. 19, 2018	Restricted Drop Deadline (You may no longer drop certain courses — see class schedule.)
Jan. 21, 2018	Add without Override Deadline
Jan. 21, 2018	Last day for 0% assessment of tuition and general fees for University Withdrawal
Jan. 22, 2018	Add with Override Begins
Jan. 27, 2018	Graduation Contracts (Undergraduate) due
Jan. 28, 2018	Last day for 25% assessment of tuition and general fees for University Withdrawal
Jan. 31, 2018	Registration closes for most courses (after this date a Late Registration Change Request form may be submitted requiring a \$50 Late Registration Fee)
Jan. 31, 2018	Last day for a COF stipend to be applied for in-state students adding courses; student bills will be updated according to changes made
Jan. 31, 2018	Audit-Satisfactory/Unsatisfactory Grading Forms due
Jan. 31, 2018	Census

Fe. 4, 2018	Last day for 50% assessment of tuition and general fees for University Withdrawal
March 19, 2018	Repeat/Delete Requests due
March 19, 2018	Course withdrawal period ends (Last day to withdraw from individual courses with a W)
March 10-18, 2018	Spring Recess
May 4, 2018	Classes end
May 4, 2018	Last day to process a University Withdrawal (withdraw from all courses)
May 7, 2018	Final examinations week begins

Tentative Class/Lecture Schedule

Date	Day	Lecture Topic	To Do
1.17.18	Wed	Syllabus/History of Plant Propagation	
1.19.18	Fri	History of Plant Propagation	
1.22.18	Mon	Classifications of Plants	Chapter 2
1.24.18	Wed	Physiological Plant Processes	
1.26.18	Fri	Hormone Responses in Plants	David Holm/Potato Breeding
1.29.18	Mon	Ecotypes, Clines, etc.	
1.31.18	Wed	TBA	
2.2.18	Fri	Propagation substrates/edaphic factors	
2.5.18	Mon	Propagation Structures	
2.7.18	Wed	Seed Development	
2.9.18	Fri	Seed Propagation	
2.12.18	Mon	Atmospheric Factors in Plant Propagation	
2.14.18	Wed	Cont'd	
2.16.18	Fri	Cont'd	

2.19.18	Mon	Greenhouses Diseases/Management	
2.21.18	Wed	Cont'd	
2.23.18	Fri	Cont'd	
2.26.18	Mon	Greenhouses Insects/Management	
2.28.18	Wed	Cont'd	
3.2.18	Fri	Guest Speaker; Zach Clark-Lee	CSFS seed propagation and nursery production
3.5.18	Mon	Propagation by cuttings	
3.7.18	Wed	Cont'd	
3.9.18	Fri	Cont'd	Plant Propagation Protocol #1 due
3.12.18	Mon	Spring Break	
3.14.18	Wed	Spring Break	
3.16.18	Fri	Spring Break	
3.19.18	Mon	Vegetative Propagation	
3.21.18	Wed		
3.23.18	Fri		
3.26.18	Mon	Grafting and Budding	
3.28.18	Wed		
3.30.18	Fri		
4.2.18	Mon	Rootstocks	
4.4.18	Wed		
4.6.18	Fri		
4.9.18	Mon	Division and Layering	
4.11.18	Wed		
4.13.18	Fri		
4.16.18	Mon	Seed Development	
4.18.18	Wed		
4.20.18	Fri		
4.23.18	Mon	Seed Propagation and Germination	
4.25.18	Wed		
4.27.18	Fri		Plant Propagation Protocol #2 due
4.30.18	Mon	Seed Collection, Certification and Testing	
5.2.18	Wed		

5.4.18	Fri	Propagation Scheduling	
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Lab Schedule

Date/Day	Lab Exercise/Page #	Description
Tuesday, Jan 16, 2018	NO LABS THE FIRST WEEK OF CLASS	
Tuesday, Jan 23, 2018	Lab 10.2, page 142	Measuring substrate physical properties using perlite, vermiculite, potting mix w/perlite, sand and peat moss
Tuesday, Jan 30, 2018	Lab 6.1, page 92 & 4.1, page 59	Comparison of the Rooting Response of Leaf Petiole Cuttings from Juvenile and Mature forms of English Ivy; Effect of different concentrations of Auxin on the rooting of Coleus/Pothos
Tuesday, Feb 6, 2018	Lab 18.3, page 237	Effects of Polarity and Exogenous Auxin on Adventitious Rooting using Rose/Willow cuttings
Tuesday, Feb 13, 2018	Lab 22.1, page 276	Plantlets that form from Leaf Cuttings with Petioles using ZZ plant, Begonia, Snake plant, others
Tuesday, Feb 20, 2018	Lab 24.1, page 297 & 24.2, page 298	Drop or Mound Layering (will need to set this up in the greenhouse); Air Layering using Ficus/Rubber tree/Hibiscus in Conservatory
Tuesday, Feb 27, 2018	Lab 36.2, page 433	Response of Two Species to Scarification and Stratification using Honeylocust, Kentucky Coffeetree, Golden Raintree, Eastern Redbud or Mimosa
Tuesday, Mar 6, 2018	Lab 36.1, page 431	Comparison of Different Scarification Techniques to

		Enhance the Germination of Honeylocust and Mimosa
Tuesday, Mar 13, 2018	Spring Break; No Labs	
Tuesday, Mar 20, 2018	Lab 27.1, page 333	Tomato Grafting Lab (see also Cornell YouTube Video/Johnny's seeds handout)
Tuesday, Mar 27, 2018	Lab 26.2, page 326 & 26.3, page 327	Splice grafting using Coleus; Whip and Tongue Grafting using Hibiscus and Ficus
Tuesday, Apr 3, 2018	Lab 25.1, page 319 & 26.1, page 324	Top Wedge Grafting of Hibiscus; T-Budding with Rose
Tuesday, Apr 10, 2018	Lab 32.1 & 32.2, page 386	Tissue Propagation using mint seeds and cuttings
Tuesday, Apr 17, 2018	Lab 29.1, page 350 Lab 29.2, page 352	Propagating Lilies from Scale Leaves; Propagating Hyacinth Bulbs
Tuesday, Apr 24, 2018	Lab 29.3, page 353; take final data on lab experiments	Division of Dahlia and Potato
Tuesday, May 1, 2018	Clean up greenhouse; students pot up any plants they want to keep, throw away unwanted plants, clean out trays, pots, etc. for re-use next year (if salvageable)	Turn in Experiment Journal