

PLS 597 Commercial Grape Production Lecture Schedule by Weeks

1. Introduction to Viticulture
 - a. Special characteristics of Viticulture
 - b. Technical constraints in grape breeding and vineyard management
 - c. Pressures for change in the worldwide industry
2. History of Viticulture
 - a. the grapevine in the Old World
 - b. the grapevine in the New World
 - c. World grape industries
 - d. Specific uses of the grapevine
 - i. Wine production
 - ii. Table grape production
 - iii. Raisin production
3. The grapevine and its relatives
 - a. The family Vitaceae
 - b. The genera of Vitaceae
 - i. Evolution of the Vitaceae
 - c. The genus *Vitis*
 - i. Classification
 - ii. Systematics of *Vitis*
 - iii. Cytotaxonomy and chemotaxonomy
 - d. Evolution of species in the genus *Vitis*
 - i. Resistance to pests and diseases
 - ii. Barriers to interbreeding
 - iii. Definition of species
 - e. The genus *Muscadinia*
 - i. Classification
 - ii. Taxonomy of *Muscadinia*
 - iii. *Muscadinia* germplasm in grapevine breeding
 - f. The genus *Aestivalis*
 - i. Classification
4. Cultivars of grapevines
 - a. Wine cultivars
 - i. *Vitis vinifera* and other traditional cultivars
 - ii. Direct producers
 - iii. Native American cultivars
 - b. Table grape and raisin cultivars
 - c. Rootstock cultivars
5. The structure of the grapevine: Vegetative and reproductive anatomy
 - a. The shoot system
 - i. Juvenile and adult morphology
 - ii. The shoot of the current season
 1. Prompt bud
 2. Latent bud
 3. Summer lateral

- iii. Theoretical aspects of Vascular Anatomy
 - iv. Vascular anatomy of the grape stem
 - v. Connection of leaves to the primary shoot
 - vi. Developmental aspects of vascular anatomy
 - vii. Secondary vascular anatomy of the stem
 - viii. Ripening of the cane
 - ix. Radial growth of the trunk and cordons
 - b. The root system
 - i. Root morphology
 - ii. Root anatomy
 - c. Leaves
 - i. Structure
 - ii. Ampelography
 - d. Inflorescence and flowers
 - i. Formation of inflorescence and flowers
 - ii. Flower type
 - iii. Reproductive anatomy
 - iv. Pollination and fertilization
 - v. Embryo, endosperm and seed (seedlessness)
 - e. The grape berry
 - i. Botanical definition of the berry
 - ii. Anatomy of the berry
 - iii. Vascular anatomy of the berry
- 6. Developmental physiology: the vegetative grapevine
 - a. Carbohydrate production by the vine
 - i. Photosynthesis
 - ii. Stomata
 - iii. Environmental regulation of grapevine photosynthesis
 - iv. Effects of cultural practices on photosynthesis
 - b. Carbohydrate utilization
 - i. Respiration
 - ii. Carbohydrate partitioning within the leaf
 - iii. Carbohydrate translocation
 - c. Vine growth
 - i. Phenology
 - ii. Bud dormancy and bud break
 - iii. Shoot and leaf growth
 - iv. Growth of permanent structures
 - v. Root growth
 - vi. Relations between root growth and growth of shoots and fruits
 - d. Reserves of the grapevine
 - i. Carbohydrate reserves
 - ii. Mineral nutrient reserves
 - iii. Nutritional aspects of leaf senescence and abscission
- 7. Developmental physiology: flowering and fruiting in the grapevine
 - a. Regulation of flowering in the grapevines

- i. Hormonal aspects of flowering
 - ii. Environmental factors in flowering
 - 1. Temperature
 - 2. Light intensity
 - 3. Photoperiod
 - 4. Water stress
 - 5. Mineral nutrition
 - b. Fruit growth and its regulation
 - i. Fruit set
 - ii. Berry growth
 - 1. Stage I
 - 2. Stage II
 - 3. Stage III
 - 4. Control of fruit expansion
 - 5. Gas exchange in the fruit
 - c. Fruit ripening
 - i. Changes in phytohormones associated with ripening
 - ii. Carbohydrates and organic acids
 - iii. Nitrogenous compounds
 - iv. Phenolics
 - v. Pigments
 - vi. Volatiles
- 8. The cultivated grapevine
 - a. Planting considerations
 - b. Ecological effects on grapevine adaptation
 - c. Climatic influences and site selection
 - i. Macroclimate
 - 1. Damaging winter temperatures
 - 2. Winter severity index
 - 3. Frost free days
 - 4. Growing degree days
 - 5. Growing season mean temperature
 - 6. Precipitation patterns
 - ii. Mesoclimate
 - 1. Elevation
 - 2. Slope
 - 3. Aspect
 - iii. Land properties
 - 1. Soils
 - a. Internal water drainage
 - b. Composition
 - c. Type
 - d. Texture
 - e. Organic matter
 - f. Acidity and Liming
 - 2. Current Land cover

- d. Cold hardiness
 - i. Frost vs. Freezes
 - ii. Frost/freeze protection
- 9. Culture
 - a. Yield components
 - b. Factors affecting cultivar adaptation
 - c. Vineyard site preparation and planting
 - i. Direction of rows
 - ii. Row and Vine Spacing
 - iii. Planting stock
 - iv. Land preparation
 - v. Weed control and cultivation
 - vi. Vine preparation and planting
- 10. Managing Young vines
 - a. First year
 - b. Second year
 - c. Third year
 - i. Vinifera
 - ii. Hybrids and American cultivars
- 11. Trellis systems
 - a. Single canopy systems
 - i. Single high-wire
 - ii. Vertical shoot position
 - b. Divided canopy systems
 - i. Geneva double curtain
 - ii. Scott-Henry
 - iii. Smart-Dyson
- 12. Training systems
 - a. Head training
 - i. Head-trained and spur-pruned
 - ii. Head-trained and cane-pruned
 - b. Bi-lateral cordon training
 - c. Cordon training with spur-pruning
- 13. Canopy Management
 - a. What is the Canopy?
 - b. Steps in Canopy Management
 - i. Shoot thinning
 - 1. Dormant pruning
 - a. Terminology of pruning
 - b. Balanced pruning
 - c. Mechanical pruning
 - 2. Growing season shoot thinning
 - ii. Shoot positioning
 - iii. Cluster thinning
 - 1. Timing
 - 2. Location within shoots

- iv. Hedging
 - 1. Single canopy systems
 - 2. Divided canopy systems
 - 3. Mechanical aspects
 - v. Leaf pulling
 - 1. Timing
 - 2. Location within canopy
14. Grapevine nutrition
- a. Macronutrients
 - i. Nitrogen
 - ii. Phosphorus
 - iii. Potassium
 - iv. Sulfur
 - b. Micronutrients
 - i. Iron
 - ii. Copper
 - iii. Boron
 - iv. Zinc
15. Grapevine Diseases and Insects
- a. Diseases
 - i. Crown gall of the grape
 - ii. Pierce's disease
 - iii. Anthracnose
 - iv. Black rot
 - v. Downy mildew
 - vi. Powdery mildew
 - vii. Summer bunch rot diseases
 - b. Insects
 - i. Insects injuring roots
 - 1. Grape phylloxera
 - 2. Grape root borer
 - ii. Insects feeding in canes, cordons and trunks
 - 1. Grape trunk borer
 - 2. Grape cane borer
 - 3. Ambrosia beetle
 - 4. Grape can girdler
 - iii. Insects injuring developing primary grape buds
 - 1. Steely beetle
 - 2. Climbing cut worms
 - iv. Insects injuring leaves
 - 1. Japanese beetle
 - 2. Steely beetle
 - v. Insects injuring fruit
 - 1. Grape berry moth
 - 2. Red banded leaf roller
 - 3. Grape mealy bug

4. Green June beetle

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9. Dormant Pruning of Grapevines (Select one)
 - a) 1 March UK Horticulture Research Farm
 - b) 3 March UKREC Princeton
 - c) 10 March UK Eden Shale Farm

10. Training Systems for Commercial wine grapes
17 March (UK Horticulture Research Farm)

11. Soil properties and Grapevine Mineral Nutrition
10 March (UK Eden Shale Research Farm)

12. Training grapevines in the first and second leaf (UK Horticulture Research Farm)
5 April (UK Horticulture Research Farm)

13. Calibration of Air-blast sprayers (Select one)
 - a) 12 April (UK Horticulture Research Farm)
 - b) 14 April (UK Eden Shale Farm)

14. The Five Steps of Canopy Management (Select one)
 - a) 19 April (UK Horticulture Research Farm)
 - b) 21 April (UKREC Princeton)
 - c) 28 April (UK Eden Shale Research Farm)