From:	Bill Rooney
To:	"Nilesh Dighe"
Cc:	"Karen L Prihoda"
Subject:	Class on Tuesday Morning
Date:	Saturday, August 29, 2009 10:56:00 AM
Attachments:	AGRO642 outline - Fall 2009.doc Agro 642 Schedule - Fall 2009.xlsx agro 642 - problem set 1, fall 2009.doc Agro642 Class Roster Fall 2009.xlsx

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Nilesh:

My first class is scheduled for Tuesday, September 1. Obviously, I will not be there and I would like you to meet the class, provide the attached handouts and get them to provide us with open blocks when we can have make up classes. Once you get that information, you can give it to Karen and Karen can compile the information and report to me as to open times when all of the students are available.

We will meet for the first time on Tuesday September 8 (or earlier if Monday is an available time for make-up times.

The handouts are attached as well as a class roster. Karen - please make copies - there are currently 13 students enrolled in the class. PLEASE DON"T DISTRIBUTE THE ROSTER.

regards,

bill

Dr. William L. Rooney
Professor, Sorghum Breeding and Genetics
Chair, Plant Release Committee
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College Station, Texas 77843-2474
979 845 2151

AGRO 642
Problem Set 1
Fall 2009

1. A population was characterized for the A locus in the following population. The results follow.

Genotype	Number
A_1A_1	320
A_1A_2	470
A_2A_2	250

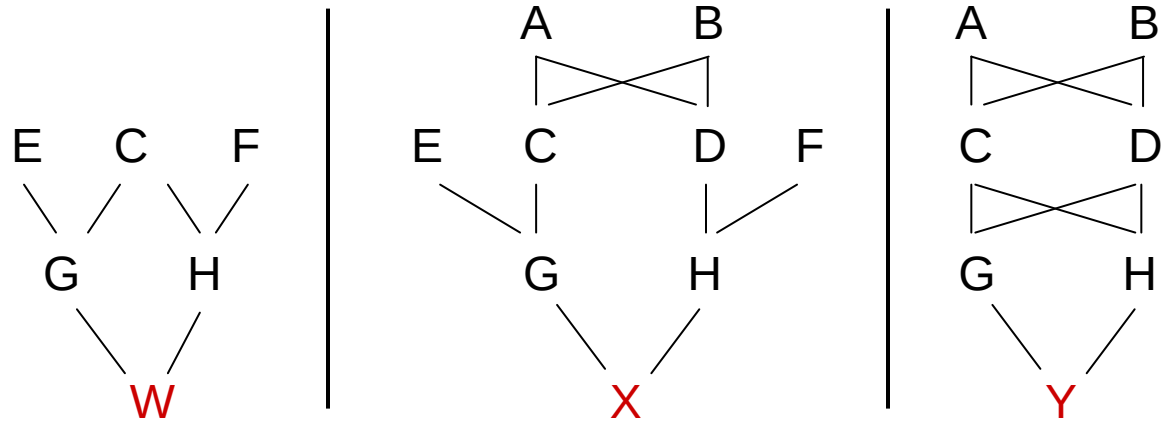
   a. Calculate genotype and allelic frequencies for the population
   b. Is the population in H-W equilibrium?

   In the next generation the same population was characterized for the A locus and the results follow.

Genotype	Number
A_1A_1	400
A_1A_2	210
A_2A_2	310

   c. Is the population in H-W equilibrium?
   d. If not, what is the most likely cause of disequilibrium?

2. Calculate inbreeding coefficients (F) for individuals W, X, and Y in the three different mating schemes. The F value of parents A, B, E, C, and F is zero.



3. Calculate the mean, average effect and describe the gene action for the following loci. Assume that the following population are in H-W equilibrium and that the environmental mean = 0.

Locus	p	q	a	d	Mean	Average effect	Gene Action
1	.5	.5	1	0			
2	.3	.7	3	3			
3	.5	.5	4	6			
4	.8	.2	4	2			

Calculate the Breeding Values and Dominance Deviations for each genotype in the population for each locus.

Locus	Estimate of	A_1A_1	A_1A_2	A_2A_2
1	Breeding Value			
	Dominance Deviation			
2	Breeding Value			
	Dominance Deviation			
3	Breeding Value			
	Dominance Deviation			
4	Breeding Value			
	Dominance Deviation			

4. Calculate the mean and describe the gene action for the following loci. Assume that the following populations are NOT in H-W equilibrium and that the environmental mean = [redacted]

5. Two different traits are controlled by multiple loci and their allele frequencies and magnitudes are provided in the following table

	Trait 1				Trait 2			
Locus	p	q	a	d	p	q	a	d
1	0.75	0.25	4	2	0.5	0.5	3	5
2	0.4	0.6	2	1	0.1	0.9	1	0
3	0.7	0.3	5	3	0.8	0.2	2	2
4	0.5	0.5	1	1	0.6	0.4	3	2
5	0.6	0.4	5	5	0.2	0.8	1	1
6	0.7	0.3	7	7	1.0	0.0	8	0
7	0.5	0.5	4	2	0.7	0.3	2	2
8	0.4	0.6	2	1	0.9	0.1	6	3
9	0.3	0.7	2	1				
10	0.7	0.3	12	6				

For each trait, calculate the following items (assumptions for each are provided)

a. Means (assume the environmental mean for each is zero).
b. Variance (assume the environmental variance for each is zero)
    i. Additive (σ^2_a)
    ii. Dominance (σ^2_d)
    iii. Genetic (σ^2_g)
c. If total phenotypic variation = 25 + genetic variation, estimate:
    i. Broad-Sense heritability (H^2):
    ii. Narrow Sense Heritability (h^2):
d. Describe the types of gene action present for these two traits.

6. Twenty cultivars of cotton were evaluated in a randomized complete block (with four replications) to assess genetic variation for disease resistance. They were evaluated in a single location and the results of this analysis are provided in the ANOVA table.

Source	DF	Mean Square
Rep	3	25.38
Genotype	19	76.89
Error	57	13.32

a. Determine which effects, if any, are significant.
b. Calculate the Genotypic Variance
c. Estimate Heritability on a plot and entry-mean basis.
d. What type of heritability estimate is this?

7. Eighty HS families of corn were evaluated for grain yield to determine the heritability of this trait. The trial was grown in four environments with four replications/environment.

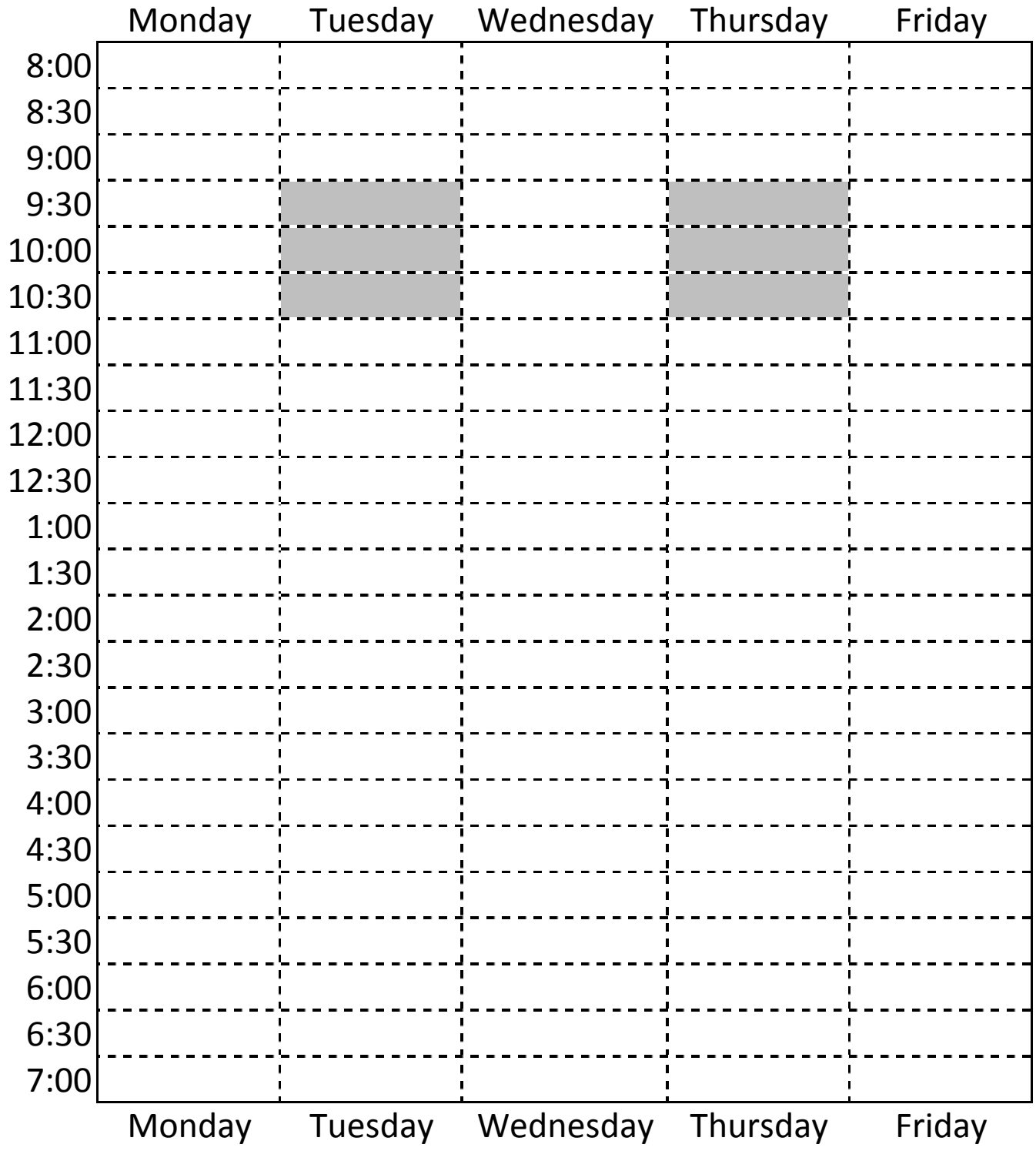
Source	DF	Mean Square
Environment	3	150.34
Rep (Environment)	12	26.47
Genotype	79	170.34
Genotype * Environment	237	66.43
Error	948	42.32

   a. Determine which effects, if any, are significant.
   b. Calculate the Genotypic Variance
   c. Calculate the Additive Variance
   d. Estimate Heritability on a plot and entry-mean basis.
   e. What type of heritability estimate is this?

8. Conduct a literature review on the relative importance of mean versus diversity in the improvement of the crop on which you are conducting your research. In particular, identify how breeding programs utilize wild germplasm. Is it common? If it is how do they integrate it? Are new technologies being used to enhance this process. Create a bibliography of journal articles addressing the issue. The review should be approximately 1-2 pages in length.

Name: _____

Please Block out the time that YOU ARE NOT AVAILABLE



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email

[redacted]

[redacted]

Name	uin	major	classification	email
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Major Advisor
Rooney

Hays
Smith

Rooney
Smith

Murray

Burow

Agronomy 642
Plant Breeding II
Fall 2009

Instructor: William L. Rooney (Bill)
Foundation Seed Building
845-2151 (office)
220-1951 (cell, but call office first)
E-mail: wlr@tamu.edu

Office Hours: Call or e-mail for appointment.

Course Description:

The goal of this course is to provide the student with an overview of plant breeding methodology, statistics and implementation. Selection theory and practice, the effect and management of genotype*environment interaction, and computer management of a breeding program will be discussed. Initial studies in all of these areas assume that the species being improved is a diploid or allopolyploid species. The final section of the class will discuss how autopolyploidy in specific crops affects genetics and breeding strategies.

Prerequisites: Undergraduate or M.S. level plant breeding course

Textbooks: The course relies on significant publications from journal articles and no textbook is required. There are several textbooks that are excellent references for the topics covered in this class. They include:

Bernardo, Rex. 2002. Breeding for Quantitative Traits in Plants. Stemma Press, Woodbury, MN.
Little, TM, and FJ Hills. 1978. Agricultural Experimentation - Design and Analysis. John Wiley and Sons. New York.
LOTS OF JOURNAL ARTICLES!

Computer Software: The problem sets are based upon various computer software programs. As needed, the software will be provided. Details will be provided at a later date.

Grading:

Exam I	20%
Exam II	20%
Problem Sets (3)	30%
Final Exam (written)	30%

Agronomy 642
Plant Breeding II - Outline
Fall 2009

I. Basic Principles of Plant Breeding
   a. Diagram of Plant Breeding
   b. Examples of Breeding
II. Review of Genetic Principles (quantitative)
   a. Hardy-Weinberg and Deviations
   b. Genetic Means
   c. Genetic Variances
   d. Covariance of Relatives
   e. Heritability – calculations, considerations
III. Identifying and Exploiting Genetic Diversity
   a. Create Genetic Variability
   b. Presence of Genetic Variation
      PROBLEM SET 1
IV. Selection Theory and Practice
   a. Heritability - implications and uses
   b. Multiple-trait selection (selection indices)
   c. Indirect selection
   d. When to select (early generation testing)
   e. Where to select (environment)
   f. Problems/Consideration in Selection
   g. Marker-assisted selection
      EXAM 1, tentatively scheduled for the week of October 20
V. Statistical Topics for Plant Breeding
   a. Analysis of Single Location
   b. Combined Analysis Locations
   c. Inferences
   d. Statistical Designs used in Plant Breeding
   e. Breeding Decisions in Evaluation and Statistics
      i. Testing sites
      ii. Allocation of replications vs. locations
      PROBLEM SET 2
VI.G x E interactions and Stability Analysis
   a. G x E issues
   b. Stability analysis parameters
      EXAM 2, tentatively scheduled for the week of December 1
      PROBLEM SET 3
VII. Breeding in an Autopolyploid Crop
   a. Quantitative genetic theory
   b. Population improvement methods
   c. Cultivar development methods
      FINAL EXAM, Friday, December 11