AGRICULTURE AND MAN  PRT 2008
Dr. Tan Yee How (ex Assoc. Professor)
Dr. Ganesan Vadamalai (Assoc. Professor)
Faculty of Agriculture, Universiti Putra Malaysia

Golden Rice!
- Milled rice does not contain beta-carotenes
- Vitamin A deficiency afflicts over 200 million children and woman
- About 500,000 children go blind (60 every hour!)
- 2 million children under 5 years die each year

Ingo Potrykus (Switzerland) and Peter Bayer (Germany)
PROGRAM: BACELOR ----- 
(melalui PENDIDIKAN JARAK JAUH, UPMET)

SESSION: Semester II, 2013-14

COURSE: PERTANIAN DAN MANUSIA   PRT 2008 
(ARGRICULTURE & MAN)

CREDITS: 2 + 0

LECTURERS: 
Dr. Tan Yee How (ex Assoc. Professor)
alvinyht@yahoo.co.uk, 016-3951526 (mobile)

Dr. Ganesan Vadamalai (Assoc. Professor) 
Department of Plant Protection, Block E 
Faculty of Agriculture, Universiti Putra Malaysia 
43400 Serdang, Selangor Darul Ehsan 
ganesanv@upm.edu.my, 03-89474843 (UPM), 012- 
3719244 (mobile)
OBJECTIVES

At the end of the course, a student will be able to:

1. explain the role of agriculture in the development of civilization and well-being of mankind

2. elucidate the importance of the agricultural sector in ensuring food security and basic industrial resources

3. discuss and evaluate the importance of agricultural resources and their management for the development of sustainable agriculture
SYNOPSIS

This course explores the evolution of agriculture from the beginning to the present as a planned activity for food security and wealth creation, driven by sustainable economic and technological advancement.

Modern agriculture is presented as a science, an art and a business, encompassing its role and impact on resource utilization and human development.
COURSE EVALUATION

1. **MID-TERM EXAMINATION**
   based on Chaps 1-5
   - 30%

2. **FINAL EXAMINATION**
   based on all Chaps 1-9, with major emphasis on Chaps 6-9
   - 40%

3. **GROUP ASSIGNMENT**
   - 30%

**TOTAL**
- 100%
MID-SEMESTER EXAMINATION
(30 Objective Questions, based on the first five chapters)

1. Introduction & Scope of Modern Agriculture
2. Transformation of Agriculture - Agricultural Evolution
3. Transformation of Agriculture - Agricultural Revolution
4. Agro-Ecological System - Basic Agricultural Resources and the Environment
5. Genetic Resources in Agriculture
FINAL EXAMINATION

(40 Objective Questions, based on all chapters with major emphasis on last five chapters, 6-9)

6A. Sustainable Agriculture
6B. Agricultural Practices in Malaysia
7. Economics of Agricultural Development
   (Agriculture and the Malaysian Economy)
8. Innovation & Challenges in Agriculture
9. Approaches to Agricultural Development in Malaysia
EXAMINATIONS
(MID-TERM and FINAL)

You will be examined on the contents of the power-point lectures. All these are available on-line based mainly on the PJJ UPMET module Agriculture & Man (by Yusof Ibrahim & Tan Yee How, 2007)
Questions would be objective (multiple choice) in nature.

Example:
The crop which is economically the most important in Malaysia is:

A. rubber
B. oil palm
C. cocoa
D. coconut
E. none of the above

Answer: B
Example:
The following is (are) a good agricultural practice (s):

A. using compost as fertilizer
B. tillage (ploughing)
C. crop rotation
D. two of the above
E. all three (A, B, C) of the above

Answer: D
Example:
Most of the oil palm estates in peninsular Malaysia are found in the north:

A. True
B. False

Answer: B
GROUP ASSIGNMENT
(TUGASAN)
1. A critical review is conducted on a topic pertaining to agriculture selected from a list to reflect a grasp of the salient features and understanding of the principles involved in the subject.

Write with particular reference to MALAYSIA.

You could source information for your assignment from the library, Internet or on-site visits to relevant places.
ASSIGNMENT TOPICS

1. Advocating good agricultural practices
2. Impact of Asean Free Trade Area (AFTA) on Malaysian agriculture
3. Fertilizer production from oil palm empty fruit bunch (EFB) in Malaysia
4. Food safety
5. Halal hub
6. Carbon trading and Clean Development Mechanism (CDM)
7. ICT in Malaysian agriculture
8. Integrated farming in Malaysia
9. Agricultural biotechnology
10. Genetically modified organisms (GMOs) in agriculture
11. Technology transfer in agriculture
12. Environmental issues in agriculture
13. Agriculture as the third engine of growth in Malaysia
14. Mushroom cultivation in Malaysia
15. Biodiversity
16. Agrotourism
17. Recreational fishing
18. Labour problems in agriculture
19. Mechanization and automation in agriculture
20. Precision agriculture
21. Agriculture for non-food purposes
22. Aquafarming
23. Micro-organisms in the Malaysian agricultural industry
24. Entrepreneurship in agriculture
25. Hydroponics
26. Organic farming
27. Benefiting from agricultural wastes
28. Can agriculture survive against industrialization on the road towards developed nation status?
29. Agriculture as a desired profession in the 21st century
30. Agriculture in developing and developed nations
2. For this task, students will be assigned into groups based on their location by the Course Lecturers (Dr. Tan and Dr. Ganesan).

3. You will be informed on-line or through your center on the particular group you are assigned by around the 4th week once the registration of students has been finalized.

4. You are NOT PERMITTED to switch to another group under any circumstance. If you do so, your assignment report will not be marked even if you submit it. You will receive 0 mark!

5. Each group can select any topic from the list.
6. The assignment has to be written in English.

7. Avoid ‘cut and paste’ and full references must be made if this is done. Try to write using your own words.

8. At the end of the review exercise, each group will submit a written report consisting of no less than 15 typewritten pages, font 12, 1½ spacing, inclusive of photographs and illustrations.

9. Ensure you include a ‘Contents’ page at the beginning of the report and quote your ‘References’ at the end.
10. Pictures speak a thousand words so include photographs wherever relevant.

11. All members of the group must have their names on the report which is bar coded. Any student whose name is not on the report will not receive any mark.

12. Marks are group-based with all members of a group receiving the same mark. This emphasizes the importance of group discussion and teamwork.

   You should try to make contact with all your group members at an early stage.

13. The report has to be submitted to UPMET on time otherwise it will not be marked.
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CHAPTER 1

INTRODUCTION & SCOPE OF MODERN AGRICULTURE
TOPIC 1: INTRODUCTION & SCOPE

- Definition of agriculture
- Importance of agriculture
- Agricultural systems and practices
- Downstream processing
Definition of Agriculture

- art and science of cultivating soil
- systematic production of crops for food, feed, fiber
- raising livestock
- protecting land from deterioration and misuse.
TOPIC 2: Importance of agriculture

- At least **40%** (2002 estimate) of the world’s population is employed in agriculture, making it the most common occupation.

- **Asia’s** share of the agricultural labour force reaches 80%:
  - **India & China** - 60%
  - **Africa** - 14%
  - **Europe** - 10%
  - **Latin America** - 3.5%
  - **North America** - 1.0% (highly mechanized)
TOPIC 3:
Agricultural Systems/Practices

Broadly categorized into:

• Subsistence farming
• Commercialized farming.
Subsistence agriculture
Subsistence agriculture
Commercial agriculture
Commercial agriculture
Commercial agriculture
TOPIC 4: Downstream (2°) Processing
CHAPTER 2

TRANSFORMATION OF AGRICULTURE – AGROECOLOGICAL EVOLUTION
TOPIC 1

Pre-historic era through the Middle Ages, and
Domestication of plants and animals
Mesopotamia to 2500 BCE
Ancient China

Early cultures:
Xia (c. 2200 B.C.),
Shang (c. 1750 B.C.),
Zhou (c. 1050 B.C.)
Harappa/Indus River Valley: Ganges, Mohenjo-Daro

Extent and major sites of the Indus Valley Civilization

Present day excavated ruins of Mohenjo-daro, an ancient city along the Indus river
Prehistoric Era

- **Human started farming 12,000 years ago** (prehistoric, as recorded history started 7000 years ago)

- Initially, **grain crops** like **wheat** were cultivated, then **rye** and **barley**, later followed by **peas** and **beans**
Sickle from chalcolithic times (2500-1800 years BCE)

Dental swing plough

Millstone for grains

Sumerian Harvester's sickle, 3000 BCE
By 14\textsuperscript{th} and 15\textsuperscript{th} C, new plants and animals were shipped from the Old World to the New World.

\textbf{Agribusiness} was borne with the idea of large scale cultivation for export, including linen and silk.
TOPIC 2

UTILIZATION OF HUMAN LABOUR, ANIMALS, MACHINES, INFORMATION TECHNOLOGY, TRANSPORTATION AND BIOTECHNOLOGY
Remote sensing, GPS and precision farming increased yields and varieties
Biotechnology in Agriculture

• While most industries use mechanical devices (machines) to make things, biotechnology uses living organisms to make products of economic value.

• Genetic engineering creates transgenic life forms superior to their original version.
Teosinte (A), the ancestral native corn that existed thousands of years ago in Central America, bears little resemblance to the modern corn plant. Through selective breeding, corn with an intermediate genetic mix was obtained (B). Continued selection resulted in the modern corn plant (C). The selective breeding process takes centuries. Today, genetic engineering technology makes it possible to breed plants for specific traits within a single generation.
TOPIC 3

VALUES, CUSTOMS and TABOOS in TRADITIONAL AGRICULTURE Vs MODERN AGRICULTURE
TOPIC 4

THE CULTURE OF NOMADIC AND SEDENTARY AGRICULTURE
Nomadic (subsistence) agriculture
- Slash and burn
Sedentary agriculture – fixed, stationary
TOPIC 5

INFLUENCE OF RELIGION ON AGRICULTURE
• Islam and other religions give a lot of attention on agriculture.

• Many Quranic verses mention agriculture eg importance of bees in producing honey for food and medicine.

• Agricultural activity placed as very important where at least one person in a community must be involved in agriculture as a career.

• Christian biblical principles for agricultural development state that God is the first farmer and initiator of agriculture
TOPIC 6

INFLUENCE OF LIFESTYLE ON AGRICULTURE
CHAPTER 3

TRANSFORMATION OF AGRICULTURE -

AGRICULTURAL REVOLUTION
AGRICULTURAL REVOLUTION

- Green revolution (1960s): Improved crop variety and yield
- Blue revolution (present): Enough water for drinking and irrigation
TOPIC 1

CAUSAL FACTORS
• Population increase

• Resource constraints

• Product choices

• Environmental-friendly practices

• Technological development
TOPIC 2

CHARACTERISTICS OF AGRICULTURAL REVOLUTION
• High-yielding and disease-resistant varieties

• Chemicals and bioagents

• Precision agriculture

• Mechanization and automation

• Biotechnology

• Agricultural enactments and schemes
Mechanization and Automation

- Use of **machines** to replace manual labour or animals
- Save **energy and time**
- Used in **irrigation, fertigation and controlled environmental systems**
BIOTECHNOLOGY - Tissue culture
Malaysian Farm Accreditation Scheme (SALM)

- SALM is a national program implemented by the Department of Agriculture to recognize and accredit farms which adopts good agricultural practices (GAP), operated in an environmentally friendly way and yielding products that are of quality, safe and suitable for human consumption.
CHAPTER 4

AGRO-ECOLOGICAL SYSTEM – BASIC AGRICULTURAL RESOURCES AND THE ENVIRONMENT
Topic 1

- Climate
- Water
- Soil
- Human Resources
- Genetic (‘Seed’)
CLIMATE:
Tropics
Temperate
Tundra
Desert

Alpine tundra - Alps
Arctic tundra - Russia
Tropical forest - Malaysia
Irrigation system provided by Kemubu Agricultural Development Authority (KADA)
Histosol

- is a soil comprised primarily of organic materials, found to a depth of 40 cm

- Also known peat or muck.

- In Malaysia, 2.4 million ha are covered by Histosol, mainly Sarawak
HUMAN RESOURCES
GENETIC RESOURCES
TOPIC 2

ENVIRONMENT
CHAPTER 5

GENETIC RESOURCES IN AGRICULTURE
TOPIC 1

ORIGIN and DISTRIBUTION of CROP PLANTS AND LIVESTOCK
• Centre of origin: Geographical area where a plant species, either domesticated or wild, first developed with special characteristics

• 6 independent centres recognized
Mesoamerica (Southern Mexico, and North Central America).

Cereals:
Maize
Pseudo cereals:
amaranth, Chenopodium,
chia (Salvia)
Pulses:
Phaseolus beans
Roots & tubers:
sweet potato, cassava,
Jerusalem
Oil crops:
cotton
Fiber:
cotton, agave
Fruits:
papaya, avocado, guava,
prickly pear
Vegetables & Spices:
pepper, squash, tomato,
vinegar
Stimulants:
cacao

Roots & tubers:
Jerusalem artichoke
Oil crops:
Sunflower
Fruits:
strawberry, grape,
cranberry, pecan
Stimulants:
tobacco
TOPIC 2

GERMPLASM & BIODIVERSITY
• **GERMPLASM**: genetic resources, or more precisely the **DNA** of an organism and **collections of that material**.

• **Worldwide there are collections of plant, animal and bacterial germplasm** for use in breeding new organisms and the conservation of existing species.
Biodiversity of life
BIODIVERSITY HOT SPOTS
TOPIC 3

GENETIC VARIATION & CONSERVATION OF GENETIC RESOURCES
To date 1.7 million species have been identified and named:

- about 1,000,000 animals (750,000 insects)
- about 250,000 plants
- about 69,000 fungi

Each species is given a binominal (double) name:

- *Zea mays* = corn
- *Homo sapiens* = humans
- *Elais guineensis* = oil palm
THEORY OF NATURAL SELECTION: Charles Darwin

• Over time, these early cells mutate to create new life forms.

• If these new forms are favoured by the environment, they will be selected and retained.

• Accumulated mutations over thousands of years will result in a new species. This gives rise to the biodiversity of life we see today.
Techniques for conservation of genetic resources

• There are two major alternatives for the conservation of genetic resources
  – *in situ* conservation
  – *ex situ* conservation
IN SITU CONSERVATION
EX SITU CONSERVATION
REFERENCES