



AFRICA
UNIVERSITY
A United Methodist-Related Institution

"Investing in Africa's Future"

COLLEGE OF HEALTH, AGRICULTURE & NATURAL SCIENCES

NACP213 Principle of Crop Production

END OF SECOND SEMESTER EXAMINATIONS

APRIL/MAY 2024

LECTURER: Mr Larry Kies

DURATION: 3 HOURS

INSTRUCTIONS

1. Do not write your name on the answer sheet

2. Use Answer Sheets Provided

3. Begin your answer for Each Question on a New Page

4. Credit is Given for Neat Presentation

Answer ALL questions. For questions requiring calculations, show your work and identify your answers clearly.

1. Choosing from the crops listed below, state which crops have the following protein and yield levels in Zimbabwe. (3 marks)

maize cassava sugar beans green beans soyabeans wheat
millet sweet potatoes

Protein, %	Good yields in Zimbabwe, tonnes/Ha	Crop
2	30	A.
38	4.0	B.
8.2	9.8	C.

2. A farmer wishes to plant soyabean seeds with a final population of 300,000 per hectare using rows 45 cm apart. The seed is expected to have 88% germination, and the farmer expects 5% field losses.

- What should be the final average spacing within the row? (2 marks)
- When setting the planter, what population should he use? (2 marks)
- What problems will be likely if he sows the seed too thinly? (2 marks)
- To compensate for incorrect population, what are the *plants* likely to do if the seeds are sown too thinly? (1 mark)

3. Discuss the principle of sowing seeds at the correct *depth*. Give examples. (4 marks)

4. Fill in the table for the following crop plants. For the Latin names, choose from the following:

Apium graveolus *Capsicum frutescens* *Phaseolus vulgaris*. *Beta vulgaris*;
Lycopersicon esculuntum *Ipomoea batatas* *Manihot esculenta* (9 marks)

Common name	Latin name	Most important part of the plant for marketing	Botanical family
Green bean			
Sweet potato			
Celery			

5. Integrated Pest Management has four major components. Two are Biological and Cultural. Discuss the other two components, giving at least two examples of each. (8 marks)

6. Compare tropical legumes vs tropical grains regarding the production of protein *per Ha*. Give one example of each of yields of protein per Ha, showing your calculations. (3 marks)

7. a. Explain briefly the best type of on-farm crop variety trial for a graduate student who wishes to publish a paper but has limited land for field trials. (2 marks)

b. The table below shows characteristics of three Starke-Ayres carrot varieties.

i. Which variety is best when long roots are needed?

ii. Which variety is best when customers prefer Nantes-shaped roots but Alternaria is a problem?

iii. Which variety is best when dark, Nantes-shaped roots are needed?

GENERAL CHARACTERISTICS	STAR 3001	MAESTRO MAESTRO S	SUGARSNAX
Relative Days Sowing to Maturity			
- Summer	105 - 120	100 - 110	100 - 120
- Winter	130 - 140	120 - 130	120 - 140
Root Length (cm)	16 - 18	14 - 18	23 - 27
Shape (Nantes or imperator)	Nantes	Nantes	IMP
Colour (Orange) <i>1=Dark / 9=Light</i>	1	3	1
Uniformity <i>1=Good / 9=Poor</i>	1	2	2
Top Growth Height <i>1=Short / 9=Long</i>	1	6	5
Alternaria Tolerance <i>1=Good / 9=Poor</i>	3	1	2
Optimal Sowing Times	Spring & Autumn	Spring & Late Summer	Spring & Late Summer
Utilization P = Processing H = Home Garden FP = Fresh Market Prepacks FB = Fresh Market Bunching	P, FP	P, FP, FB	P/ Cut & Peel / Sticks

(3 marks)

8. Follow the instructions for each set of questions.

(9 marks)

Each set of four statements has **one** that is correct. Write the **letter** of the true statement on your answer sheet.

i. a. Carrot is an example of a legume that is best sown directly.

b. Soyabeans require 1500 mm of rainfall.

c. Sweet potatoes are normally propagated using seeds.

d. In Zimbabwe, Bambara nuts are mostly grown by small-scale farmers.

ii. a. Grain stores best if it is well-dried before storage..

b. Lodging is often a problem with crops planted at densities lower than recommended.

c. An example of a crop usually grown as a green manure is cabbage.

d. Wheat prefers hot conditions during the vegetative stage.

iii. a. Rainfall in semi-arid tropical areas tends to be reliable even if it is not abundant.

b. The international organization that coordinates maize research is ICRISAT.

c. Using a seedbed, then transplanting, always results in a crop that is ready to harvest sooner.

d. Compared with clay loam soil, sandy soil needs to be irrigated more frequently, with less water each time.

Multiple choice. Write the letter of the **best** answer on your answer sheet.

- iv. In a typical garden rotation, which crop would best follow *cabbage*?
- cauliflower
 - green beans
 - cabbage
 - carrots
 - broccoli
- v. A catch crop is usually sown
- far away from the main crop
 - at the same time as the main crop
 - after the optimum time for sowing the main crop has passed
 - in a site to catch the insects that will attack the main crop.
 - at a site which will more likely catch more rainfall
- vi. Evidence to support Vavilov's theory of Centres of Origin include:
- Archeological - using C^{14} dating methods
 - Linguistic - the name of a crop has some meaning at its centre of origin
 - Botanical - wild relatives are usually found at the centre of origin
 - All of the above
 - None of the above
- vii. Which **cereal** crop requires the **least** amount of rainfall?
- bambara nuts
 - millet
 - maize
 - sorghum
 - cassava
- viii.. The system that usually has the *lowest* input of human energy relative to food energy harvested is:
- slash-and-burn
 - large-scale commercial farming
 - small-scale commercial farming
 - traditional farming using animal draft power
 - none of the above. All systems are the same in this regard.
- ix. In a typical garden rotation, which crop is suitable to follow green beans?
- Broccoli
 - spinach
 - Brussell sprouts
 - Swiss chard
 - ALL of the above crops are suitable.
9. a. A farmer wishes to apply 105 kg/Ha of nitrogen to a crop. She first applied 400 kg of Compound C (6:18:15).
How many kg of urea (46% N) should she apply? Show your work. (2 marks)
- b. Nitrogen is normally found in *compound fertilizers*. Name two other elements normally found in compound fertilizers. (2 marks)
10. Write notes about ONE crop, choosing from the crops that were presented by students in class **excluding maize**. Your notes must include, without being restricted to: botanical family, scientific name, rainfall and temperature requirements; typical yields in Zimbabwe; nutritional value, main use of the crop (8 marks)