Stage 5 Agriculture Technology: Year 9
Unit A: Vegetable production

Rationale for the development of this unit of work

Vegetable production is an important industry in the Hawkesbury region. The rich flood plains along the river and the proximity to the Sydney markets has lead to a large number of vegetable farms being established. The farmers are predominantly of Maltese origin and the crops grown include cucurbits, sweet corn, cabbage, lettuce and potatoes. There are a number of these farmers who have diversified into hydroponic production.

The Hawkesbury area is the region of the state where the mushroom industry is concentrated, we have some good contacts in the mushroom industry, and usually grow two crops per year. This can be integrated into the vegetable unit.

Vegetable production is also a good activity to teach to students to do at home. Other skills, including the use of a tractor and hydroponic vegetable production, are strongly motivating at the start of the course.

We have a good hydroponics system which has recently been renovated with a new pump and plumbing. The use of this facility will demonstrate alternative systems of vegetable production and allow us to teach plant nutrition in a production system where it is vital. This unit is designed to be taught for 30 periods of 50 minutes duration.

Assessment in this unit is by a combination of practical skills, class work, assignments and formal tests. The overall balance of assessment is 50% practical and 50% theory.

The major concepts and outcomes addressed are listed below.

Syllabus requirements	Key concepts	Outcomes
Intensive plant enterprise	Production in soil Hydroponics Mushrooms Machinery and tool use and safety Tractor Mulching Plant Nutrition pH Pests and diseases Vegetable marketing Seasonality and vegetable types Plant spacing, sowing depth	5.1.1 5.1.2 5.3.1 5.3.3 5.4.2 5.5.1 5.5.2 5.6.1 5.6.2

Concepts	Resources
Types of vegetables • Recognise the basic structure of plants (leaves, stem, roots, flowers and fruit) and relate this to the function of each part. • Identify plant structures in vegetable crops and relate these to the part we use for food.	*Enterprising Agriculture*, p. 172 *Agriculture and You 1*, p. 3 *Dynamic Agriculture 1*, p. 92
• Gather information from planting guides and vegetable production books on the range of vegetable species that are available and classify these into the culture of origin of the vegetable.	*Yates garden guide* Or www.yates.com.au NSW Dept Agriculture vegetable book
• Gather, organise and present an assignment on the range of vegetable species and varieties available in the local fruit shop or supermarket.	See assessment section *Agriculture and You 1*, p. 35.
• Plot on a map of the Hawkesbury region the areas where vegetables are farmed. From the map analyse the impact of vegetable growing in the local region and the factors which have lead to this distribution.	Hawkesbury harvest
Which vegetables to grow? • Describe the local climate from data obtained from the *Rainman* CD ROM and relate this to seasons and the current and recent weather. Include: humidity, solar radiation, wind patterns, temperature, rainfall.	*Rainman* CD ROM School rainfall records
• Keep records of current weather (max temp, min temp and rainfall) throughout the term.	Agriculture plot max–min thermometer and rain gauge
• Describe the basic requirements of agricultural plants in relation to climate and relate this to seasonality of growth. • From group discussion, identify plants that can be planted now, and throughout the year. Construct a vegetable growing plan for the year based on season of growth, time to maturity and availability of varieties as well as the group's preferences in vegetables. This could be on paper or using a spreadsheet.	Planting guides in NSW Dept Agriculture vegetable production Database of vegetable planting information School stock list of vegetable seeds

Concepts	Resources
Tools and the tractor • Identify common garden tools and their uses.	*Dynamic Agriculture* blackline master 5.8, 5.9
• Safely and correctly use and maintain garden tools. • Identify on the tractor the controls and mark these on a sheet. • Perform routine pre-start checks on tyre pressure, engine oil, hydraulic oil, coolant and fuel.	*Agfact*: Maintaining and operating a tractor *Agfact*: Basic machinery maintenance
• Drive the tractor smoothly and be able to stop, reverse and turn. • Correctly fit an implement to the 3-point linkage and connect the power take off (PTO) shaft. • Use the tractor with a PTO driven implement, e.g. slasher or rotary hoe. Choose the correct gear, lower and raise the implement, put the PTO into and out of gear, use the turning brakes correctly. • List the principles of safe operation of the tractor.	*WorkCover* book on tractor safety
How to grow vegetables *Soil preparation* • Examine the soil in the garden and recognise the soil texture and structure of the soil. • Investigate the effect of cultivation on the structure of the soil and the effect of soil conditioners, e.g. lime, gypsum and compost on the structure of the soil. • Describe alternative methods of vegetable production (mulch, use of compost, use of soil conditioners, no dig gardens) and evaluate them for production of vegetables at school. • Prepare a garden for the production of vegetables as a group using garden tools or the tractor safely and appropriately.	*Dynamic Agriculture 1*, p. 93 *Enterprising Agriculture*, p. 185 *Agriculture and You 1*, p. 31

Concepts	Resources
Seeding and transplanting • Gather information on plant spacing and seed depth for the vegetables chosen and use this information to correctly plant seeds and seedlings in the garden. • Plan and conduct a first-hand investigation using a controlled experiment into an aspect of seed or seedling growth. (Groups could choose a problem to investigate, e.g. seedling depth, germination of seeds at different temperatures, mulching, timing of fertiliser application). • Present the experiment as an individual report which includes question, hypothesis, method, results, graphs and conclusions. • Perform management operations on their vegetable production system when necessary and keep a diary of these procedures. These would include weeding, fertiliser, support structures, pest and disease control and harvesting.	*Agriculture and You 1*, p. 15 Seed packets
Fertilisers • Identify the role of fertilisers in vegetable production and the major nutrients that are applied in fertilisers.	*Enterprising Agriculture,* p. 199 *Dynamic Agriculture 1,* p. 94
• Compare the effect of nitrogen of phosphate rich fertilisers on the vegetative or reproductive growth of plants. Identify which fertiliser would be most suitable for different types of vegetable crops.	*Enterprising Agriculture,* p. 199 *Dynamic Agriculture* blackline master 5.5
Harvesting and marketing • Distinguish between the types of harvesting technologies used on the small scale and those used in commercial production, including the use of large harvesting machines.	*Dynamic Agriculture 1,* p. 254
• Investigate the prices for a vegetable crop at the Sydney markets through the past few months. Propose reasons for the variation of prices. • Assess the profitability of your vegetable production by constructing a spreadsheet of all the management procedures costs and the current prices.	*The Land* vegetable prices

Concepts	Resources
Pests and diseases • Identify the common pests and diseases of the vegetables being grown and an appropriate strategy for their control or management. • Implement and evaluate these strategies for the management and control of plant pests and diseases. • Read the labels of any pesticides to be used to find the correct methods of use and appropriate rates of application. • Use the correct safety equipment when applying pesticides or instruct someone competent to use the chemical to safely apply it for the student.	NSW Dept Agriculture vegetable book
Hydroponic vegetable production • Compare different types of hydroponic systems (liquid and media culture) and identify the advantages of each. • Understand the pH scale and the terms acid, neutral and base. Identify the ideal pH for plant production from a table of nutrient availability and one of plant preferences. • Calibrate pH and conductivity meter and take readings. Use this information to adjust nutrient and pH levels. • Safely handle nutrient solutions and acid for the hydroponic system. • Describe the difference between major nutrients and trace elements, and recognise deficiencies of nutrients • Grow plants in hydroponics and compare the growth rates of plants in the soil and in hydroponics.	*Agriculture and You 1*, p. 39 *Agfact:* Hydroponics *Dynamic Agriculture* blackline master 5.7
Mushroom production • Examine mushroom compost, and relate its constituents to the production of mushroom compost. • Contrast the production of mushrooms in a controlled environment to production of other vegetables in soil that is determined by the climate. • Participate in the seeding, capping and watering of mushrooms at the appropriate stages of their production. • Identify the mycelia and fruiting structures in mushrooms. • Pick, package and sell mushrooms. • Intensive and extensive production systems for a plant product	

Assessment

There are eight assessment tasks listed below for this unit. They consist of tasks that are assignments, class work, skills and formal tests. The mark grid below gives an indication of the value of each task and how it will contribute to the overall assessment of the students for each outcome. The combination of this and the next topic will allow an accurate report to be constructed for the outcomes addressed in this semester. Depending on the school's requirements, not all of these need to be addressed each semester, and some could be left out of the semester one assessment.

Tasks

- Gather, organise and present an assignment on the range of vegetable species and varieties available in the local fruit shop or supermarket.
- Year plan for growing vegetables.
- Mark of vegetable garden #1: spacing of seeds/seedlings.
- Mark of vegetable plot #2: maintenance of garden.
- Investigation into vegetable seed problem.
- Tractor skills:
  - Pre-start check
  - Start and drive
  - Fit an implement (group task)
  - Use a PTO implement.
- Price analysis of a vegetable crop over past three months.
- Topic test.

Components contributing to semester report	5.1.1	5.1.2	5.3.1	5.3.3	5.4.2	5.5.1	5.5.2	5.6.1	5.6.2
Vegetable types assignment	▯								
Year plan of vegetable production		▯							
Garden mark #1			▯						
Garden mark #2				▯					▯
First hand investigation into a vegetable problem						▯	▯		
Tractor practical skills								▯	
Price analysis and profitability of one vegetable crop					▯		▯		
Topic test	▯	▯	▯	▯	▯	▯		▯	▯