Crops	French bean *[Phaseolus vulguris]*	Long bean [*Vigna sesquipedalis]*
Land preparation	Two ploughing and two harrowing are recommended for good soil tilth.	- Clear the area to be used - Mark out the required size and dig - Pulverize soil and add poultry manure at the rate of 12 tons /ha or compost
Seed selection	- Healthy viable seeds treated with fungicide - Select seeds without physical damage.	- Healthy viable seeds treated with fungicide - Select seeds without physical damage.
Seed germination	-Seeding rate is 45-50kg/ha - Seeds can germinate in 6-10 days after sowing.	-Seeding rate is 7kg/ha - Seeds can germinate in 6-10 days after sowing.
Varieties	1. Contender 2. Butter bean 3. Labrador	1. Snake yard long. 2. Local white
Spacing & density	- 50cm apart in rows. - 15-20cm between the plants within the rows. - 100'000 plants /ha	-90-100cm apart in rows. - 30cm between the plants within the rows. - 3300 plants /ha
Transplanting seedlings	- Directly planted. - 2-3 healthy seeds are directly planted 4-5cm deep.	- Directly planted. - 2-3 healthy seeds are directly planted 4-5cm deep
Cultivation &fertilizing	- Inter-row cultivation is done to control weeds and hill soil around the plants. - NPK 13:13:21 is applied as basal application at the rate of 200kg/ha at planting time. Urea is side dressed at the rate of 100kg/ha in 2 split applications.50kg at 2 weeks and another 50kg at 4 weeks after planting.	- Inter-row cultivation is done to control weeds and hill soil around the plants before vine creeping stage. - Stakes 1-3m long are provided for the vines to climb on. - NPK 13:13:21 is applied as basal application at the rate of 200kg/ha at planting time. Urea is side dressed at the rate of 100kg/ha 4 months after planting.
Crop protection	-Pest: Aphids - Control- Spray Dimethioate at 15ml in 15 litres of water. -Disease – Powdery Mildew - Control – Apply benomyl at 10 grams in 15 litres of water.	-Pest: Caterpillar - Control- Spray orthene at 20gram in 14 litres of water. -Disease – Powdery Mildew - Control – Apply Milcurb (fungicide)
Harvesting & marketing	- French beans can be harvested in 42-56 days after sowing. - Pick tender well filled pods that snap easily. - Yield 5-8 tons/ha - Sold in local markets.	- Tender pods can be harvested 6-8 weeks after sowing. - Pick tender well filled pods that snap easily. - Yield 5-8 tons/ha - Sold in local markets.
Post-harvest management	Adequate storage space, cool temperature and relative humidity will help long beans stored for a long period of time.	Adequate storage space, cool temperature and relative humidity will help long beans stored for a long period of time.

Lettuce *[Lectusa sativa]*	English Cabbage *[Brassica oleracea]*	Crops
- Clear the area to be used- Mark out the required size and dig- Pulverize soil and add poultry manure at the rate of 5 tons /ha or compost and leave for 2 weeks to decompose [Also read notes on seedbed preparation]	- Clear the area to be used- Mark out the required size and dig- Pulverize soil and add poultry manure at the rate of 5 tons /ha or compost and leave for 2 weeks to decompose [Also read notes on seedbed preparation]	Land preparation
- Healthy viable seeds treated with fungicide - Select seeds without physical damage.	- Healthy viable seeds treated with fungicide - Select seeds without physical damage.	Seed selection
Seeding rate is 300g/ ha - Seeds can germinate in 6-10 days after sowing.	-Seeding rate is 300g/ ha - Seeds can germinate in 4-6 days after sowing.	Seed germination
Head type: 1. Great Lakes 2. Boxh ill Leaf type: 1. Butter crunch 2. Green Mignonette	1. Green Cross. 2. K.K Cross 3. K.Y Cross 4. Sri Gowa 5. Resist Crown	Varieties
- 75cm apart in rows. - 30-40cm between the plants within the rows. - 2500 plants /ha	-75cm apart in rows. - 45-60cm between the plants within the rows. - 2500 plants /ha	Spacing & density
- At 3-4 leaf stage (5-8 days after sowing) seedlings are ready for transplanting. - Seedlings are carefully lifted and transplanted in the garden.	- At 2-3 leaf stage (3-4 weeks) seedlings are ready for transplanting. - Seedlings are carefully lifted and transplanted in the garden.	Transplanting seedlings
- Inter-row cultivation is done to control weeds and hill soil around the plants. Mulching is done during dry season. Manual weed control using hoe. - NPK 13:13:21 is applied as basal application at the rate of 200kg/ha at planting time. Urea is top dressed at the rate of 100kg/ha 2- 4 weeks after transplanting.	- Inter-row cultivation is done to control weeds and hill soil around the plants. Frequent watering is needed during dry season. - NPK 13:13:21 is applied as basal application at the rate of 200kg/ha at planting time. Urea is side dressed at the rate of 100kg/ha 2- 4 weeks after transplanting.	Cultivation &fertilizing
-Pest: Slugs - Control- Keep surrounding clean, spread Blitzem pellets as per instruction on the label. -Disease – Soft rot - Control – Remove all leftover crops after harvesting. Apply Sundomil at 53 grams in 16 litres of water.	-Pest: Aphids and Diamond back moth - Control- Spray Atabron in alternation with Delfin only when recent damage is visible. -Disease – Black rot. - Control – Buy seeds from reliable dealers and use a two year rotation.	Crop protection
- Leafy Lettuce can be harvested in 50-80 days after sowing. - Head type matures in 12-15 weeks after sowing. - Cut the stalks at the base of the head with a sharp knife and discard the outer leaves. - Yield 8-10 tons/ha - Sold in local markets.	- English cabbage is ready for harvesting in 60-90 days after transplanting. Harvest when head is firm to the touch. - Cut the stalks at the base of the head with a sharp knife and discard the outer leaves. - Yield 15-20 tons/ha - Sold in local markets	Harvesting & marketing
In ventilated room, temperatures should be kept just above freezing and a high humidity maintained.	In ventilated room, temperatures should be kept just above freezing and a high humidity maintained. Heads may be damaged by storing at 0-1°C for 90 days.	Post-harvest management

Crops	Cucumber*[Cucumis sativus]*	Chinese Cabbage *[Brassica chinensis]*
Land preparation	- Clear the area to be used- Mark out the required size and dig- Pulverize soil and add poultry manure at the rate of 12 tons /ha and mix well in the soil before planting.	Two ploughing and two harrowing are recommended for good soil tilth. Add poultry manure at the rate of 5 tons /ha or compost and leave for 2 weeks to decompose. [Also read notes on seedbed preparation]
Seed selection	- Healthy viable seeds treated with fungicide - Select seeds without physical damage.	- Healthy viable seeds treated with fungicide - Select seeds without physical damage.
Seed germination	- Seeding rate is 2kg/ ha - Seeds can germinate in 5-7 days after sowing.	-Seeding rate is 300g/ ha - Seeds can germinate in 4-6 days after sowing.
Varieties	1. Supermarket 2. Market king 3. Progress	Head type: 1. Wong Bok Leaf type: 1. Pak Choi Kwang Moon
Spacing & density	- 100cm apart in rows. - 30cm between the plants within the rows. - 3300 plants /ha	-75cm apart in rows. - 30-40cm between the plants within the rows.
Transplanting seedlings	- Directly planted. - 2-3 healthy seeds are directly planted 12 – 15mm deep.	- At 3-4 leaf stage (3-4 weeks after sowing) seedlings are ready for transplanting. Wet the seed bed before lifting the seeds for transplanting. - Seedlings are carefully lifted and transplanted in the garden in the after noon or on a cloudy day.
Cultivation &fertilizing	- Hoeing and hand weeding are effective methods of weed control. Frequent watering and weeding is needed till creeping stage. Stakes or trellises are provided for the vines to climb on. - NPK 13:13:21 is applied as basal application at the rate of 200kg/ha at planting time. Urea is applied at first flowering at the rate of 100kg/ha.	- Inter-row cultivation is done to control weeds and hill soil around the plants. Frequent watering is needed during dry season. - NPK 13:13:21 is applied as basal application at the rate of 200kg/ha at planting time. Urea is side dressed at the rate of 100kg/ha in 2 split applications.50kg at 2 weeks and another 50kg at 4 weeks after transplanting.
Crop protection	-Pest: Aphids - Control- Apply Rogor and application rate doffers according to seriousness of infestation. -Disease – Blossom end rot - Control – Use healthy seeds of resistant varieties or spray Dithane M-45.	-Pest: Aphids and Diamond back moth - Control- Spray Steward at 7.5ml in 15 litres of water. -Disease – Soft rot. - Control – Apply Dithane M-45 at 22g in 15 litres of water or practice crop rotation.
Harvesting & marketing	- Cucumber can be harvested in 6-8 weeks after planting and picking continues for 3 weeks. - Cut or clip the fruit when the skin is uniformly green. - Yield is 10-15 tons / ha. - Sold in local markets.	- Chinese cabbage is ready for harvesting in 4-6 weeks after transplanting. Harvest when head is firm to the touch. - Cut the stalks at the base of the head with a sharp knife and discard the outer leaves. - Yield 10-15 tons/ha - Sold in local markets
Post-harvest management	Store Cucumber in a cool place which has a relative humidity of 50-55%.	- Wash the plants well and keep in cool place or market straight away.

Crops	Tomatoes *[Lycopersicum esculentum]*
Land preparation	Two ploughing and two harrowing are recommended for good soil tilth. Add poultry manure at the rate of 12 tons /ha or compost and leave for 2 weeks to decompose. [Also read notes on seedbed preparation]
Seed selection	- Healthy viable seeds treated with fungicide - Select seeds without physical damage.
Seed germination	-Seeding rate is 300g/ ha
Varieties	1. Alton 2. Alafua Large 3. Valley pride
Spacing & density	-1.5m apart in rows. - 45-60cm between the plants within the rows. - 1500 plants /ha
Transplanting seedlings	- At 5-6 leaf stage (3-4 weeks) seedlings are ready for transplanting. - Watering withheld 4 days before for better establishment of the transplant.
Cultivation &fertilizing	- Inter-row cultivation is done to control weeds and hill soil around the plants. -Mulching the plots during dry season. - Stakes 1-3m long are provided before creeping stage to support the plants. Carry out gap filling and pruning. - NPK 13:13:21 is applied as basal application at the rate of 200kg/ha at planting time. Urea is side dressed at the rate of 100kg/ha 2- 4 weeks
Crop protection	-Pest: Corn earworm - Control- Spray Orthene at the rate of 20grams in 14 litres of water. -Disease – Bacterial Wilt - Control – Plant resistant varieties and practice crop rotation.
Harvesting & marketing	- Tomatoes are ready for harvesting in 12 weeks after transplanting. Harvest when base of the fruit turns yellow. - Grasp the tomatoes firmly but gently and pull upwards. - Yield 10-20 tons/ha - Sold in local markets and food processing companies.
Post-harvest management	- Must be well ventilated room, temperatures should be kept just above freezing and a high humidity maintained. - Susceptible to bruises injury and must be handled with proper care always.

PENANG SANGAM HIGH SCHOOL
P.O.BOX 44, RAKIRAKI
LESSON NOTES

Year/Level: 10
Subject: AGRICULTURAL SCIENCE **Week 13**

STRAND	STRAND AS10.3 AGRONOMY
SUB STRAND	SUB – STRAND AS 10.3.2 HORTICULTURE
CONTENT LEARNING OUTCOME	AS 10.3.2.1. DEMONSTRATE CULTIVATION PRACTICES ON SELECTED VEGETABLES

Lesson 1 and 2: cultivation and marketing practices of Long Bean and French Beans

Lesson outcome:

1. Discuss the cultivation, management and marketing practices of long beans, English cabbage, tomatoes, French bean, lettuce, Chinese cabbage and cucumber.
2. Grow any four listed vegetables in the school garden

Vocabulary

Scientific Name - Is a formal system of naming species of living things by giving each a name composed of two parts, both of which use Latin grammatical forms. The first part of the name identifies the genus to which the species belongs; the second part identifies the species within the genus.

Planting Season - Main growing season for the plant where maximum yield can be attained.

Varieties The different types of crops which belong to the same botanical family.

Management - Any practice that is performed onto the soil or plant in order to increase productivity or health of the plant or animal.

Seed-bed - Plot where seedlings are raised for transplanting purpose; it can be in a nursery or a plot in the garden

Plant density - The number or planting materials needed to cultivate one hectare of land.

Cultivation - The proper preparation of any land by man for the planting of crops or raising of animals

Harvesting - The process of reaping the crops for sale in the market.

Marketing - The process of using/selling the end product of an agricultural enterprise

Post-Harvest Management - The care of the harvested crops to maintain its quality for a longer Period of time