

Pest and Disease Management

Pests	Recommendations	ITEMS	AMOUNT (P)
VARIABLE COSTS			
Cucurbit beetle dust seedling with wood or rice hull (Aulocophora Similis)	ash. Spray with soap solution (4tbsp soap/16 L of water). If needed Spray with permethrin or cypermethrin Or other appropriate chemicals following The recommended rates.	<i>Labor (P220/man-day [MD])</i>	
Aphids (aphis Gossypii)	Spray hot pepper (100 g macerated hot pepper/16L water) and soap solution. If needed, deltamethrin, or other Appropriate chemicals following the Recommended rates.	Clearing (20 MD) Plowing (P800/tractor hr x 8 hrs) Harrowing (P800/tractor hr x 4 hrs) Furrowing (P350/man-animal-day x 4 days) Bed preparation (10 MD) Manure/fertilizer application (15 MD) Planting (10 MD) Trellising (50 MD) Vine training/pruning (10 MD) Side dressing/hilling up (10 MD) Spraying (8 MD) Weeding/hilling up (30 MD) Irrigation (10 MD) Mulching (Optional) (30 MD) Harvesting (30 MD) Miscellaneous (e.g., hauling, repairs, etc.) (10 MD) Subtotal	4,400 6,400 3,200 1,400 2,200 3,300 2,200 11,000 2,200 2,200 1,760 6,600 2,200 6,600 6,600 2,200 64,460
Fruit fly (Bactrocera Cucurbitae)	collect infested fruits and bury. Use fruit fly attractant such as methyl eugenol, basil or 'tuba' (coconut wine) with molasses (2 parts tuba and 1 part molasses).	Materials	
Cutworm (spodoptera Litura)	use biological insecticides such as bacillus thuringiensis and Nuclear Polyhedrosis Virus (NPV). Collect NPV-infected cutworm larvae and store in the freezer for later use. Infected larvae are swollen with foul smell. These can be macerated then diluted at 12 infected larvae per 16 L water. Fully-grown larvae killed due to NPV infection hang with their head down, holding on with the abdominal pro-legs. Use light traps to control cutworm moth. If needed, spray with insecticides such as fipronil. Fenvalerate, MIPC, permethrin, or other appropriate chemicals following the recommended rates.	Seeds (2 kg) Manure (60 bags) Fertilizer -14-14-14 (3 bags) -46-0-0 (2 bags) -0-0-60 (2 bags) Plastic mulch (7 rolls) (may be used up To 3 croppings)* Insecticides (5 L) Fuel and oil Trellis materials Packaging materials (1,500 pcs) Miscellaneous (e.g., pail, gloves, etc.) Subtotal	1,400 6,000 2,469 1,942 1,706 5,134 2,000 4,000 12,000 3,000 2,000 41,651
Leaf miner (liriomyza spp)	conserve natural enemies like spiders, lacewings, and syrphid flies. If needed, Spray with cyromazine or cartap Hydrochloride following the recommended rates. Alternate different products of recommended pesticides to prevent development of pesticide resistance. Intercrop with other vegetables such as pole sitao. Maintain low weed population along alleys for habitation of natural enemies.	<i>Interest on Production Loans at 21% per annum</i> Total (Variable Costs)	7,350 113,461

Cost and Return Analysis Hectare

ITEMS	AMOUNT (P)
VARIABLE COSTS	
<i>Labor (P220/man-day [MD])</i>	
Clearing (20 MD)	4,400
Plowing (P800/tractor hr x 8 hrs)	6,400
Harrowing (P800/tractor hr x 4 hrs)	3,200
Furrowing (P350/man-animal-day x 4 days)	1,400
Bed preparation (10 MD)	2,200
Manure/fertilizer application (15 MD)	3,300
Planting (10 MD)	2,200
Trellising (50 MD)	11,000
Vine training/pruning (10 MD)	2,200
Side dressing/hilling up (10 MD)	2,200
Spraying (8 MD)	1,760
Weeding/hilling up (30 MD)	6,600
Irrigation (10 MD)	2,200
Mulching (Optional) (30 MD)	6,600
Harvesting (30 MD)	6,600
Miscellaneous (e.g., hauling, repairs, etc.)	
(10 MD)	2,200
Subtotal	64,460
Materials	
Seeds (2 kg)	1,400
Manure (60 bags)	6,000
Fertilizer	
-14-14-14 (3 bags)	2,469
-46-0-0 (2 bags)	1,942
-0-0-60 (2 bags)	1,706
Plastic mulch (7 rolls) (may be used up To 3 croppings)*	5,134
Insecticides (5 L)	2,000
Fuel and oil	4,000
Trellis materials	12,000
Packaging materials (1,500 pcs)	3,000
Miscellaneous (e.g., pail, gloves, etc.)	2,000
Subtotal	41,651
<i>Interest on Production Loans at 21% per annum</i>	7,350
Total (Variable Costs)	113,461



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PRODUCTION

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Introduction

Bottle gourd, *Lagenaria siceraria* (Mol.) Standl., locally known as 'upo' is also called guava bean, white-flowered ground, cucuzzi, calabash, suzza melon, zucca, Italian edible gourd (English), 'yugao' (Japanese), 'po gua' (Cantonese Chinese); 'kwa kwa' (Chinese), 'bau' (Vietnamese), 'dudhi' and 'lauki' (India). It originated probably in Africa and was widely distributed during the pre-Columbian times, perhaps by floating on the seas. It traveled to India, where it has evolved into numerous local varieties, and then China, Indonesia, and as far as New Zealand. It has been used by people for thousands of years in the tropics and subtropics.

Bottle gourd is an annual climbing vine with large leaves (15-30 cm in diameter) and a lush appearance. The foliage is covered with soft hairs. The branched vines and tendrils spread or climb 3-15 m. The large, white flowers open in the evening and remain open until the following midday.

Uses and Nutritional Value

Young fruits are boiled or stewed. The skin is peeled, the seeds can be scooped out, and the white flesh is cut into the desired size. It is good as a sautéed vegetable dish or as an ingredient in soups.

Per 100g edible portion, the fruit contains:

Properties	Amount
Water (g)	95.1
Energy (kcal)	18.0
Protein (g)	0.5
Fat (g)	0.1
Dietary fiber (g)	2.8
Carbohydrates (g)	3.8
Ash (g)	0.5
Calcium (mg)	24.0
Phosphorous (g)	16.0
Iron (mg)	0.4
Vitamin A (ug)	2.0
Thiamine (mg)	0.04
Riboflavin (mg)	0.02
Niacin (mg)	0.4
Ascorbic (g)	12.0

Source: The Philippine Food Composition Tables, 1997. Food and Nutrition Research Institute-Department of Science and Technology (FNRI-DOST).

Dried mature fruits are preserved with a coat of wax, lacquer, or shellac. These are made into durable containers, churrs, ladles, spoons, pipes, carved object, and musical instruments. Its uses are practically endless- birdhouses, snowmen, drums, shakers (a percussion instrument), rattles, vases, bowls, and figurines.

In traditional medicine, young shoots and leaves are used for enema. The pulp is used for cough treatment, as purgative is applied to the head during delirium and to the soles for burning feet. The oil from seed is applied for headaches. The seeds are used as anthelmintic.

Production Management Varieties

Variety types vary from elongated to round. Skin color may be white, light green, and dark green. Most of the commercial varieties are elongated and may be open-pollinated varieties (OPV) or hybrid.

Open Pollinated Varieties F1 Hybrids

Long senator	Dalisay
Maxi	Gauri
1042-1	magnifica
Tambuli	Valentina
Tambuli Supreme	
Upo Grande	

Soil and climate requirements

Bottle gourd thrives in many types of soil but grows well in light, organic rich soil. A 6.0-7 soil pH is recommended. It performs well all year round at a temperature range of 18°-30°C. It can be grown in low- to mid-elevation areas.

Land preparation

Plow and harrow the areas 2-3 times. Make furrows 3-4 m apart. Provide adjacent plots with canals for furrow irrigation.

Mix thoroughly well-decomposed animal manure at 2-3/ha and/or 14-14-14 at 3 bags/ha during bed preparation.

Mulching

Use plastic mulch to suppress weeds and to conserve soil moisture. After making the raised beds and incorporating manure, lay plastic mulch with the silver side up. Set up during the warmest part of the day to ensure that the plastic is well stretched. Secure

the ends and the sides with soil. Make holes 0.5-1.0 m apart using heated tin cans with handle. The plastic mulch can be used for up to three cropping without being removed from the plot. This means huge savings on land preparation and weed control. Other materials that can be used as mulch are rice straw, grass clippings and other farm debris.

Planting

Bottle gourd is plated either by direct seeding or transplanting. Seeding rate is 2-3 kg/ha seeds. After basal fertilization with organic and/or inorganic fertilizers, directly sow seeds per hills at a spacing of 2-3 m between rows and 1-1.5 m between hills. Cover lightly with soil and apply mulch using grass clippings or rice straw. If transplanted, sow seeds in plastic trays or plastic cups with a potting mix composed of coir dust or rice hull ash, compost, and garden soil at 1:1:1 ratio, water the soil before and after sowing. Cover the trays with paper or a thin layer of rice straw to minimize moisture loss. Keep in partial shade of up to 30% because higher shading levels will result in weak and lanky seedlings. Water regularly, Transplant 2-3 weeks after sowing.

Trellising

It is best to grow bottle gourd using overhead trellis. Some growers do not use trellises, which produce fewer fruits of lesser quality. Put up bamboo posts or saplings along the beds at a distance of 3 m depth of 0.5 m, and height of 2 m. Set up the braces at the end of the rows to further support the trellis. Install a network of wires to connect the poles at the top and another row of wire or nylon string on the network of wires running along the rows to support the wires in the overhead trellis.

Fertilization

The general fertilizer recommendations is 100 kg/ha N, 100 kg/ha P2O5, and 120 kg/ha K2O. However, proper fertilization should be based on soil analysis. Use of well-decomposed chicken manure at 2-3 t/ha will contribute 40-60 kg NPK and micronutrients. The balance can be supplied by 14-14-14 at 3 bag/ha applied as basal fertilizer at planting and another 3 bags at 30, 45, and 60 days after planting.

Pruning and vine training

Prune secondary vines below the overhead trellis. Prune also old and diseased leaves. Train the vines on the overhead trellis.