HORTICULTURE NOTE NO. 25

VEGETABLE CROP: GARLIC

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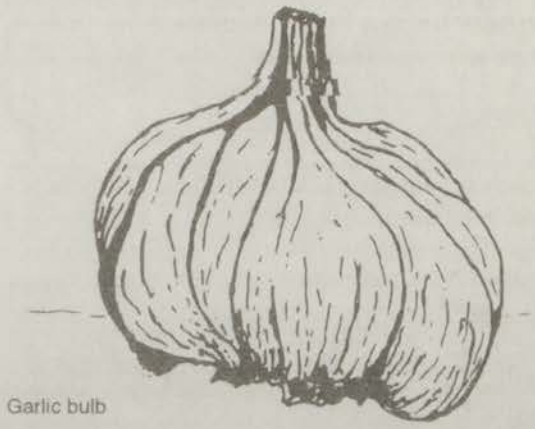
WHAT THE PLANT LOOKS LIKE

Garlic belongs to the onion and leek family but it is different from the common onion in several ways:

a. The leaves are flat and folded lengthways, not round and hollow.

b. The mature bulb is made up of many small bulbs known as cloves.



Garlic bulb

HOW IT IS USED

Because of the strong flavour and smell, garlic is mainly used as a flavoring for other foodstuffs.

The cloves are also used for planting.

Garlic cloves

Garlic clove

WHERE IT GROWS

Garlic needs moist conditions for establishment, warm and moist conditions for growth, as are found in the **highlands**, and warm dry conditions at maturity for proper curing*.

Garlic has been grown in the lowlands of Indonesia but performs better in the highlands in the cooler conditions. Poor bulbing occurs when temperatures get above 20°C late in the season.

Garlic in the lowlands grows slowly and suffers from early death resulting in low yields with too small bulbs.

For successful lowlands production a heat-tolerant variety must be used.

SOILS AND FERTILIZERS

The best soils for garlic growing are well drained, of high fertility and with a p H of about 6.5.

Heavy soils may cause mis-shapen bulbs. Lime can improve the structure of clay soils as well as reducing soil acidity which is common in PNG.

The amount of fertilizer used will depend on soil type, previous cropping and present soil fertility. Trials in PNG (Gunther 1992) have shown that fertilizer application rate can be a major factor in Increasing bulb size.

On virgin volcanic soils Triple Super Phosphate (TSP) may be the only requirement applied as a base dressing at or before planting at 250 - 750 kgs/ha (1/2 - 1 1/2 large tin fish per 10m²).

Soil analysis will indicate if nitrogen or potassium is required.

As a general guide for other soil types a base fertilizer recommendation of 500 kgs/ha 12:12:17 (1 large tin fish per 10 m²).

Soils known to be low in phosphorus should have TSP added in the base dressing.

* Curing: Drying the garlic bulbs after harvest to reduce further water loss and entry of disease.

A trial at Aiyura used both 500 kgs/ha 12:12:17 **and** 250 kgs/ha TSP (1.5 large fish tins of 2:1 mix per 10 m^2) and got a mean bulb size of 17.2 grams compared with 1.9 grams for garlic with no fertilizer. Higher rates of fertilizer gave even higher mean bulb sizes (Gunther 1992).

A side-dressing of 150 kgs/ha urea (1 large fish tin per 25 m^2) may be required at **initial bulbing**. Urea (nitrogen) **should not be applied** late in the growing season as it may increase rots.

VARIETIES

Australian varieties form bulbs with the lengthening of days and the increasing of temperatures.

As daylenght does not change significantly throughout the year in PNG we must use short-day or day-neutral varieties which will bulb in PNG conditions. As previously stated, temperature also affects the formation of bulbs.

Two main cultivars (varieties) are grown.

One is a white-skinned type of mild pungency. the other has pink skin and is highly pungent. General demand is for **LARGE GARLIC** and this must always be kept in mind.

Existing local garlic has the advantage that it has proven that it will bulb here and you know whether it has any disease.

DO NOT PLANT imported garlic purchased in the stores as it probably will not bulb and you may introduce serious diseases such as white rot (*Sclerotium cepivora)* to your garden.

DAL are investigating the import of disease free, short-day, large-bulbed varieties.

HOW IT IS GROWN

Planting is done with cloves saved from the previous crop. Small cloves are not desirable as planting stock as they will produce small bulbs. As a guide, the cloves should be bigger than your smallest finger nail.

Cloves should be planted with the shoot-end upward (root-end down), to a depth such that the top end is just below the soil surface.

To plant a hectare you will require approximately 10,000 bulbs at 25 g each which is 250kgs of garlic. This will depend on the number of cloves per bulb which will vary.

Preparing for Planting

Separate the garlic bulbs into cloves just before planting, as whole bulbs store better than single cloves. Discard small cloves.

Plant spacing

Plant the cloves with rows 20 - 40 cms apart and the cloves 5 - 10 cms apart in the row.

Weeding and watering

The crop should be kept free from weeds. Garlic is shallow rooted so pull the weeds carefully so as not to disturb the roots.

If dry weather occurs, the crop will need watering, particularly during the period of bulb growth. Do not add water close to maturity as it will prevent proper curing.

PESTS AND DISEASES

Insect Pests

Onion thrips *(Thrips tabaci)* - feed on the leaf surfaces, causing the damaged areas to lose colour. Early signs of thrips feeding are indicated by white spots which run together to form large silvery areas down the leaf.

Control

Spray Malathion 50 (45 mls in 15 litres of water). Add a wetting agent and do not harvest for 7 days after spraying.

Diseases

Downy mildew *(Peronospora destructor)* can destroy large sections of leaf, causing losses of yield. The early symptom is a furry, violet covering on the leaf. Overcast days with high humidity favour the spread of the disease. Wet foliage will also encourage its spread.

Control

Chemical control produces variable results. Sunny breezy weather will help reduce the disease. Copper oxychloride, Dithane or Ridomil will help in the control

of the disease.

Copper oxychloride (75 grams in 15 litres of water) at 7 -10 day intervals. The withholding period is one day and wetting agent should be added.

Dithane (30 grams in 15 litres water) at 7-10 day intervals. The witholding period is 7 days and a wetting agent should be used.

Ridomill (40 grams in 15 litres water) A maximum of 3 applications at 10 day intervals when plant is actively growing and humidity is high.

Purple blotch *(Alternaria porri)*

A serious problem in onions and is wide-spread in PNG. First symptoms are sunken spots on the leaves which enlarge and turn purple surrounded by a pale area.

Control

Dithane M45 (30g per 15 litres water) (see Downy Mildew for details)

Harvesting

The crop should be harvested when the tops have gone down but are still slightly green. Pull up the bulbs and leave to dry on racks or in open mesh onion bags. Place the tops uppermost to protect the bulbs from the sun. Leave the tops on until thoroughly dry. Then, remove the tops and roots leaving 2.5 cms of top and less than 1 cm of root.

Garlic is prone to damage from both rain and hot sun so move to storage area as soon as possible.

Storage

The storage area must be dry and well ventilated so that air can circulate between the bulbs. An open-sided shed, as used for onions, will allow for this ventilation.

NEVER store garlic in plastic bags as they will soon go mouldy.

Optimum conditions are 60% relative humidity and 0°C. Storing garlic at higher temperatures of 15 - 30°C is satisfactory apart from the loss due to shrinkage.

BUDGET FOR GARLIC (1 Ha)

Income

1 m beds 3 rows/bed, 10 cms between cloves	= 300,000 plants/Ha	
Average bulb weight		25g
Potential Yield		7,500Kgs
Field Factor (70%)		
Actual Yield		**5,250 kgs**
Price Depot		K2.00/kg
Market		K4.00/Kg
Total Income	5,250kgs x K2.00 =	**K10,500**

Production Costs

Land Preparation (Tractor Hire)	=	240.00
Seed 300,000 cloves @ 30 cloves / bulbs = 10,000 bulbs		
10,000 X K0.20/bulb	=	2,000
Fertilizer		
500 Kgs NPK 12:12:17 @ K26.00/bag	=	260.00
250 Kgs TSP @ K26.00/bag	=	130.00
150 Kgs Urea @ K25.00/bag	=	75.00
Pesticide		
8 sprays X 800g Dithane	=	50.00
2 sprays X 140g Malathion	=	10.00
Total (Excluding Labour and Harvesting)	=	2,765.00
Miscellaneous costs (10%)	=	276.00
Bags (350 X 20 Kg onion bags @ K0.40 each)	=	140.00
Labour (600 person days @ K4.80 each)	=	2,880.00
Transport to depot/market		160.00
Production cost (Delivered to depot)	=	6,221.00
GROSS RETURN PER HECTARE	=	4,279.00

Production Costs and Marketing

It is difficult to estimate the demand for garlic as, at present, it is of poor quality and very expensive. It is likely that if the quality could be improved (size) and the price came down there would be a high demand for the crop.

Current outlets include local markets (K4.00/kg) and wholesalers (K2.00/kg) but growers are likely to get higher prices by selling direct to retail stores or hotels.

With estimated yields in the area of 5 tonnes per hectare a grower could expect K10,000 from one hectare and, with costs at K6,000 and profit of K4,000.

FURTHER READING

Victorian Ag Notes - Garlic Growing,
Gunther (1992). Garlic Fertilizer Trial Report

FURTHER INFORMATION

For further information and advice on garlic, contact your Regional Horticulturist.

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