HORTICULTURE NOTE No. 14

Production of Bulb Onions

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1. Introduction

The onion bulb is formed from the swollen leaf bases of the onion plant. At maturity the neck of the plant becomes soft and the leaves fall over. After lifting and drying the crop, the leaves and roots are removed and the fleshy bulbs are used. Onions have a pungent taste and are used to add flavour to stews or added raw to salads.

2. Climatic Requirements

Onions prefer a cool climate with an optimum temperature of about 20°C. Bulb formation is controlled by day length and temperature, but since there is little seasonal variation in day length or temperature year round production is possible in PNG. Onions do not like hot humid conditions which promote outbreaks of fungal and other diseases. Onions are a shallow rooted crop and require an adequate supply of moisture for growth and bulb swelling. During ripening warm dry conditions are necessary for the bulbs to mature properly.

3. Soil Requirements

Onions can be grown on most soils, but will do best on well-drained sandy loams. Avoid heavy clay and poorly drained peat as the crop does not tolerate waterlogging. Soil pH should be in the range 5.0 to 6.5, ($CaCl_2$); maximum yields are obtained over the range 5.8 to 6.5, and acid soils should be limed to bring pH into this range. Onions do not like saline soils.

4. Production Areas

Onions can be produced in most areas of Papua New Guinea providing adequate, but not excessive water supply is available. In the lowlands (below 500m) onions can be grown as a dry season crop with irrigation in areas with a pronounced dry season. In the Port Moresby area February to June sowing is recommended. Production in lowland areas that experience high all year round rainfall is not recommended. In the highlands onions are likely to do best in areas with a distinct dry season (e.g Banz and Minj, WHP; Kainantu, Henganofi and Goroka, EHP). Plant in the wet season and harvest early in the dry season. If the crop experiences prolonged dry periods irrigation will be necessary. If the crop matures during wet weather storage rots will be a problem.

5. Varieties

The following varieties should perform satisfactorily:

Texas Early Grano *(1)* Heavy yields of large top-shaped bulbs with mild flavour; does not store well.

Yellow Granex (Hybrid) *(1)* A high yielding hybrid; large flat bulbs, mild flavour; does not store well.

Gladalan Brown *(2)* High yields of globe shaped bulbs; mild flavour, does not store well.

Superex (Hybrid) *(3)* Similar to Yellow Granex but better storage.

Red Creole *(1)* Pungent onion, red flesh, firm medium flattened bulbs with fair storage ability.

A programme of variety trials is underway and recommendations are subject to review.

Seed availability

(1) Yates (New Zealand), P.O. Box 1109, Auckland 1, NEW ZEALAND.

(2) Yates (Australia), P.O. Box 72, Reevesby-2212, AUSTRALIA.

(3) Takii Seeds, P.O. Box 7, Kyoto, JAPAN.

In PNG the following companies stock vegetable seeds:

South Pacific Machinery
Brian Bell
Farmset
Hagen Pharmacy
Huon Gulf Pharmacy

Note:

Onion seed deteriorates rapidly if stored in high temperatures. It is important to sow fresh seed. Check the expiry date on the packet or tin. If old seed is used germination will be poor.

6. Production Methods

Onions can be raised in seedbeds and transplanted to the field or they can be sown directly in the field using a vegetable seed drill. Direct drilled crops usually mature 3-4 weeks earlier than transplanted crops sown at the same time.

(i) Transplanted Crops
Prepare a 1m wide raised seedbed. The length of the seedbed will be determined by the amount of seed to be sown. Incorporate a base dressing of 50 grams/m² balanced fertilizer (12:12:17). (1 large fish tin per 10m²). Well-rotted organic manure or compost should be added if available. Seed should be sown at a rate of 8 grams per square metre in the seedbed. Sow in thin lines 10cm apart running across the seedbed. 3kg of seed sown in seedbeds should give enough seedlings to plant one hectare. The seedbed should be lightly shaded with grass or shade netting (30 - 40%) until 3-4 weeks after sowing, after which shade should be removed to harden off the seedlings. Seedbeds should be at least 40m from other onion crops to prevent spread of disease. From 4 weeks after sowing spray weekly with dithane (see below) for control of leaf diseases. Seedlings are ready for transplanting when they are pencil thick (c.6mm), usually 7-8 weeks after sowing. Do not transplant weak or stunted seedlings or any that have started to bulb in the seedbed.

(ii) Direct Drilling
Land must be prepared to give a fine level seedbed. The bed should be raked or harrowed before sowing. Seed should be sown at a rate of 8kg per hectare in rows 30cm apart and 1cm deep. It is important to keep the seedbed moist until seedlings are established. If large areas are sown a herbicide should be used for weed control. (Consult your regional horticulturist for advice on herbicides).

About 8 weeks after sowing seedlings should be thinned to 7.5cm apart in the row. Seedlings should be sprayed with fungicide (dithane) from 4 weeks after sowing (see Disease Control).

7. Land Preparation and Fertilizer Application

Before direct drilling or transplanting land should be ploughed or cultivated and then harrowed or broken down to produce a fine tilth. Well rotted manure or compost should be incorporated if available. Apply 500kg/ha (1 large fish tin per 10m² 12:12:17 fertilizer before sowing or transplanting and mix into the topsoil. If the soil is low in phosphate (most PNG soils) 500kg/ha Triple superphosphate (1 large fish tin per 10m² should be added as well. If the soil is acid (pH below 5.5) lime should be added to raise the pH. Ask your Regional Horticulturist for advice on the quantity of lime to apply.

8. Planting Spacing

A spacing of 30 - 45cm between rows and 5 - 10cm between plants should be used. If heavy rainfall is likely to occur plants should be planted on beds 1 - 2m wide with drains between the beds. If the crop is grown under irrigation either furrow or sprinkler irrigation may be used. If furrow irrigation is used seedlings should be planted 7.5cm apart in rows on both sides of furrows 60 - 90cm apart. Wider spacing results in development of large bulbs.

9. Transplanting

Transplanting should be done early in the morning or in the late afternoon to avoid wilting of the crop under hot sun. If possible transplant in cool cloudy weather or when rain is expected. If not ensure that soil is moist before transplanting and water in the plants after transplanting. Plants should be covered with soil to the same depth as in the seedbed.

10. Weed Control

The crop must be kept free of weeds. This is particularly important in young direct drilled crops, but transplanted crops will probably require weeding 2 or 3 times. Shallow hoeing or hand pulling of weeds should be done so as not to damage the roots of the onions.

11. Topdressing

Transplanted crops should be topdressed with urea (150kg/ha) about 4 weeks after transplanting. Direct drilled crops should be topdressed at the same rate 10 to 12 weeks after sowing. 150kg/ha is equivalent to one large fish tin per 25m².

12. Pest Control

(i) Onion Thrips *(Thrips tabaci)* (Figure 1) Small (1.5mm long) narrow bodied insects usually found on the young leaves in the centre of the onion plant. Young thrips are yellow but mature thrips are dark brown. Damage results in the development of a silvery mottle on the onion leaves and in severe attacks leaves may be badly distorted and yield loss of up to 60% may occur.

Plants should be regularly inspected. When thrips are seen spray with Malathion 50% EC at 20ml per 10 litres water. ADD A WETTING AGENT TO THE SPRAY. Repeat weekly if necessary. (Do not harvest for 7 days after last spray).

(ii) Black Onion Aphids *(Neotoxoptera formosana)* (Figure 2) A rather fat-bodied black aphid found in groups on leaves of the onion plants. Aphids can reach large numbers in favourable weather conditions.

Control:
Spray with orthene 10g per 10 litres water. ADD A WETTING AGENT TO THE SPRAY. (Do not harvest for 3 days after last spray).

(iii) Crickets and cutworms
Crickets and cutworms may damage newly transplanted seedlings.

Crickets chew off the leaves of the seedlings above ground level. They often hide in long grass adjacent to the vegetable plots. The crickets come out to feed at night.

Control:
Apply a bait consisting of:- 100ml Malathion 50% EC
1kg layers' mash

Mix with enough water to form a paste and scatter around seedlings in late afternoon after transplanting.

Cutworms *(Agrotis ipsilon)* are grey coloured caterpillars which live in the soil. The skin has a greasy appearance. The fully grown larva is up to 45mm long. The cutworms chew off young seedlings at or just below soil level.

Control:
1. Clean cultivate the land to be planted for 6 weeks before transplanting. This will kill cutworms present in the soil by starvation. This is the recommended method for control of cutworms.

2. If (1) is not possible either apply a bait of 3g Dipterex 95SP to 1kg layers' mash moisten with 1.5 litres of water, preferably a day or two before transplanting or apply a spray of Ambush 50EC at 2ml per 10 litres of water to cover the rows of newly transplanted seedlings.

13 Disease Control

(i) Purple Blotch *(Alternaria porri)* (Figures 3a and 3b) This disease is widespread in PNG and often results in serious leaf damage. First symptoms are small whitish sunken spots on the leaves. Spots enlarge and the centre turns purple surrounded by a chlorotic (pale) area up to 10cm long. Brown-black spores develop on the affected area. Leaves die back from the tip causing severe leaf loss. The disease can also affect bulbs and seedstalks.

Control:
Spray with Dithane M45 (20g per 10 litres water) or Benlate (20g per 10 litres water). Repeat weekly to protect plants from disease. Add a wetting agent to the spray. (Do not harvest for 3 days after last spray).

(ii) Downy Mildew *(Peronospora destructor)*
First symptoms are the appearance of yellowish areas on leaves. In humid weather a covering of purplish-grey spores develops. Leaves die back from the tips, beginning with the oldest leaves. Seedstalks are also affected. The disease is favoured by cool humid weather. It is not as common as purple blotch.

Control:
Spray with Dithane M45 as for purple blotch or spray with Ridomil (10g per 10 litres). Add a wetting agent to the spray. (Do not harvest for 3 days after last spray).

(iii) Soft rot *(Pseudomonas cepacia)*
This soft rot has attacked bulbs in irrigated crops in the Port Moresby area. The outer scales are infected first but disease spreads to other scales. The innermost leaf bases appear to remain disease-free. Normally the disease appears to enter through wounds. The disease also causes a storage rot, entering through the neck after leaves have been cut off.

Control:
Avoid injury to the bulbs. Make sure the neck is thoroughly dried before removing the leaves. Varieties Texas Early Grano and Yellow Granex apear susceptible.

(iv) Other Diseases
Leaf anthracnose *(Colletotrichum circinans)* has been observed on crops in the Port Moresby area. Other storage rots probably occur including another bacterial soft rot *(Erwinia carotovora)* and black mould *(Aspergillus niger)*. Field diseases not so far found in PNG include basal rot *(Fusarium oxysporum)* and white rot *(Sclerotium cepivorum)*. Consult your area horticulturist if you are unable to identify a disease affecting your crop.

For information on storage and marketing see Horticulture Note No. 15.

For further information contact your Regional Horticulturist:

Papua: P.O. Box 417, Konedobu,N.C.D
Momase: DAL Erap, P.O. Box 1984, Lae
New Guinea Islands: L.A.E.S., P.O. Kerevat, E.N.B.P.
Highlands: DAL, P.O. Box 766, Goroka.

Copies of this Horticulture Note may be obtained from: Publications Section,Department of Agriculture and Livestock, P.O. Box 417, Konedobu, N.C.D.

Fig. 1.

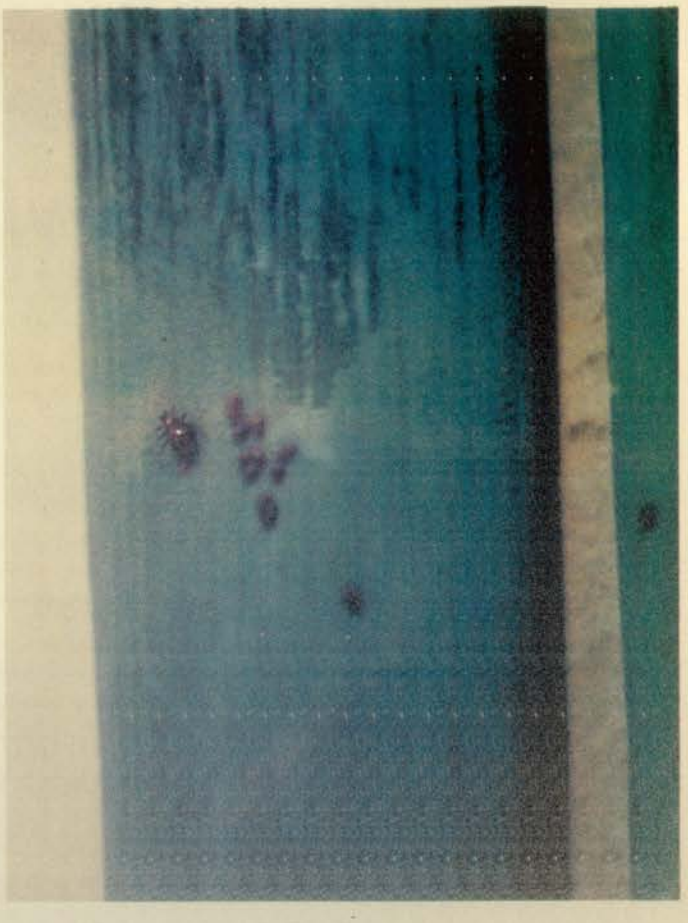

Fig. 2.

Fig. 3(a)
(left)

Fig. 3(b)
(above)

Fig. 1. ONION THRIPS
Fig. 2. BLACK ONION APHIDS
Fig. 3(a) PURPLE BLOTCH
Fig. 3(b) PURPLE BLOTCH