HORTICULTURE NOTE NO. 26

GROWING OF BULB ONIONS IN THE LOWLANDS OF CENTRAL PROVINCE

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ABSTRACT

The growing of Bulb Onions, their harvesting and curing in PNG are discussed. Marketing and profitability of the crop is outlined. At a yield of 20 tonnes per hectare growing Bulb Onions is considered as a highly profitable business venture for a small scale farmer.

INTRODUCTION

Onion *(Allium cepa)* production in Papua New Guinea (PNG) is limited to smallholder vegetable growers, thus the supply is not sufficient to meet domestic market requirements. Domestic onion consumption is therefore supported by imported onions. It is estimated that about 2000 tonnes of onions (Wiles, unpublished), worth about half a million kina, is imported annually from Australia and New Zealand (NZ).

In an effort to promote self surfficiency in onion production, the Department of Agriculture and Livestock has been conducting a series of onion trials in the lowlands and highlands to select suitable 'short- day' varieties for local conditions.

Potential onion production areas are those with a distinct dry and wet season. In the Highlands Pitt (1988) identified Banz and Minj in the Western Highlands; Kainantu, Henganofi and Goroka in the Eastern Highlands. Work done by Bull and Bourke (1983), Bull (1985), Wiles (1992) and the author futher comfirms that parts of Central Province especially around Port Moresby offer good potential for onion production.

Having identified 'short-day' varieties and potential production areas, there is enought information to support and promote onion production in Papua New Guinea for the domestic market.

The Department of Agriculture and Livestock Research Division started onion research in the 1980s. The aims of these trials were two fold. Firstly to screen, evaluate and select potential 'short-day' varieties under local conditions. Secondly to identify the best time of sowing and transplantig.

RECOMMENDED VARIETIES

At Laloki Agriultural Research Station, Bull and Bourke (1983) reported that 'short-day' varieties can be sown from Febuary to June, to mature during the dry season, July to November. Following these trials a list of varieties were released for areas around Port Moresby. The recommended varieties were Texas Early Grano, Yellow Granex and Red Creole (Bull 1985).

In a revised list of recommended varieties, Wiles (1992) confirmed Texas Early Grano and Red Creole. Variety Yellow Granex was not recommended because of its poor storability. However, Wiles (1992) once again confirmed the three earlier recommended varieties. Two additional varieties, Gladalan Brown and Superex (Hybrid) were also included.

Potential red bulb varieties to be considered (apart from Red Creole) include Agrifound Dark Red, Agrifound Light Red, and Red Pinoy. These varieties have marketable yields of 23.82, 11.64 and 11.47 tonnes per hectare respectively (Sowei, unpublished) in a 1993 trial.

Furthermore, a series of varieties screening and evaluation trials were conducted at Laloki from 1991-1993, from which a number of varieties were selected (Table 1).

TIME OF PLANTING

Day length is very important for bulbing in onion *(A. cepa)* and Garlic *(A. sativum)*. It simply means the number of hours from when the sun rises till sunset.

It is generaly accepted that all varieties of the common onion (*A. cepa)* are long-day plants. This means that they require a minimum day length to be exceeded

Table 1: **A list of selected onion varieties for the low lands of Central Province.**

Variety	Marketable Yield (t/ha)	% DM	Seed Source
Rio Enrique	42.27	6.60	Rio Colorado, Brazil.
Gladalan Brown*	35.20	7.00	Yates, Australia
Tropic Brown	33.96	7.40	Yates, New Zealand
Superex*	33.42	7.30	Takii, Japan
Dessex	30.89	7.70	SunSeeds, USA
Yellow Granex	29.42	6.90	SunSeeds, USA
Pira Ouro	28.36	11.10	Agroceres, USA
Texas Early Grano	27.91	7.60	Yates, New Zealand.
Rio Bravo	27.02	7.60	Rio Colorado, Brazil.

*** Previously Recommended Varieties.**

before they can form bulbs. In the temperate regions the control mechanism for bulbing is what researchers have termed the 'critical minimum day length'. Bulbing response is triggered at a certain critical day length and may vary from one variety to another. Day length is, determined by the distance from the equator (latitude) and the time of the year (in the Southern Hermisphere the longest and shortest days occur on the 22nd of December and 22nd June respectively).

In PNG, Bourke (1983) reported that the difference between the longest day of the year and shortest day between Lorengau (2° South) and Port Moresby (9.5° South) is 12 minutes and 1 hour respectively. In Port Moresby longest day is 12.5 hours and the shortest day is 11.5 hours.

Onion varieties grown under different latitudes and in different seasons have had to adapt to these conditions. This gave rise to the modern day terminology of the different classification of onions depending on their bulbing response to day length - 'short-day', 'intermediate-day', and 'long-day' types. In commercial 'short day' onions the minimum day length required for bulb formations is less than in 'long day' onions.

Under tropical and sub-tropical conditions, seasonal variations in daylength is small compared to daily temperatures. The role of temperature on onions was studied by Heat (1945) and Abdalla (1967). Their findings have supported the argument that in the temperate regions, temperatures enhance (>15°C) or delay (<15°C) the bulbing process.

At high temperatures, bulb formation is accelerated due to the effects of temperature on the physiological and hormonal control mechanism of the onion plant (Abdalla, 1967). In the lowlands of Central Province, daily temperatures during the dry season can be as high as 31°C. High temperatures may be responsible for premature bulbing of some varieties in the seedbed. But according to Dr. Wiles (pers. comm.) premature bulbing occurs in late sown onions when day length in seed bed in September or October is greater than in June or July. Observations at Laloki showed that varieties Early Lockyer Brown and Early Yellow Premium formed bulbs prematurely in June 1993 (Sowei, unpublished). However, variety Early Yellow Premium may be suitable as a late season crop (July to September) but that has to be confirmed. This view is however, not shared by Dr Wiles (pers. comm.) who believes that this variety would be expected to show greater premature bulbling in late sowings.

It is therefore advisable to follow the recommended time of sowing until suitable varieties can be identified for a late season crop. Work done by Bull and Bourke (1983), Bull (1985), Wiles (1992) and the authors have confirmed that the best time of growing onions in the Central Province is to plant from February to June and harvest during the dry season, July to November.

PLANTING TECHNIQUE

Very little is known about direct drilled onions in PNG. The technique described in this guide is based on transplants. A good crop of onion requires good nursery techniques and management. Field seed beds have proved successful being better than trays (Wiles, pers. comm.). At Laloki the potting mix is prepared by using 3 parts sterilized soil (2 parts black and 1 part river soil) to 1 part fine sand. Add fine chicken manure (pure droppings from layers) and/or NPK (12:12:17:2) at 500 kg/ha (half match box full per seedling tray). Keep the potting mix moist for about 5 days before sowing. Sow seedlings at a row spacing of about 3 centimetres. To avoid wasting seeds a fine sowing should be attempted. After germination, the seedlings should be kept in the nursery under 40 to 50 percent shade cloth for 4

weeks. Harden off the process of exposing seedlings to direct sunlight for several hours during the day the seedlings for another 4 weeks before transplanting. The hardening process prepares the young seedlings to adapt easily to natural field conditions after transplanting. For further information on how to establish a vegetable nursery refer to the Horticulture Note No.23 by the author in Harvest Vol.15 No.2.

Field plots should be prepared to a fine tilth. Add chicken manure and NPK fertilizer at recommended rates 1 week before transplanting. This allows the fertilizers to breakdown quickly and become available to the plants after transplanting. Transplanting should preferably be done in the morning or late in the afternoon because of low humidity and high temperatures in areas around Port Moresby.

The standard plant spacing to use is 7.5 cm between plants and 30 cm between rows. The seedlings should be planted about 1 cm, just below the soil surface. This enables the bulb to form properly above the soil. Planting too deep into the soil may restrict bulb swelling especially in hard clay soils.

CROP MANAGEMENT

Fertilizer Requirement

Organic fertilizers e.g chicken manure and inorganic (NPK and Urea) may be used for increased yields in low fertility soils. The recommended rate for NPK (12:12:17:2) is 500 kg per hectare, which should be applied once before transplanting. A top dressing of urea at 150 kg per hectare should be applied 4 weeks after transplating. Recommended rates for chicken manure are not available for onion. At Laloki about 500 kg per hectare of chicken manure was applied (2 kg per 40 m^2 plots).

Weeding

Onion is a poor competitor therefore the plot must be kept weed free during the early stages of growth. After the plants have established, weeding should be done only when necessary. On large farms, pre-emergent herbicide such as chlorthal (Rogers 1977) marketed as Delozin S (ADAS 1982) is applied during seeding. Dacathal was successful in Hagen (Wiles, pers. comm.). Other postemergence herbicides are also available.

Irrigation

Areas with a distinct dry season such as Port Moresby requires supplemental irrigation. Irrigation is when you pump water from a creek, river, or from an underground well to water the crops. The system of irrigation used for most crops including onions at Laloki is the sprinkler system. Other systems of irrigation available include furrow and drip irrigation.

Crop Protection

A disease of economic importance to onion is caused by a fungal pathogen *Alternaria porri*. The disease is widespread in PNG and it destroys fully developed and young leaves of onion. For a well documented symptom please see Horticulture Note Number 12 (Harvest Vol. 14 No. 1-2). Preventive control can be achieved by fortnightly application of benlate or dithane at 20 grams per 10 litres of water. The disease can be very serious during the wet season.

Occasional pests which may become serious at times are onion thrips *(Thrips tabaci)* and the black onion aphids *(Neotoxoptera formosana)(problem in the highlands only)*. If noticed onion thrips should be controlled by using malathion (rogor) at 20 mls per 10 litres of water. Aphids can be controlled by spraying with orthene at 10 grams per 10 litres of water. Repeat weekly if necessary.

HARVESTING AND CURING

Upon maturity the neck or leaf stalk just above the bulb becomes soft and falls over. Harvesting would normally proceed after about 80 percent of the plants have reached this stage. At Laloki a transplanted crop of onion took 5 months to fully mature (from sowing). A direct drilled crop may take longer to mature.

For a small-scale grower in central province, the usual practice would be to lift the bulbs manually. It is best to harvest bulbs selectively as the leaves fall. The next process is to dry or cure onions in the field for about 2 to 3 days. Curing is the process by which the leaves, neck, and outer skin is allowed to dry properly. To avoid scorching, curing should preferably be done during cool dry weather. However, to avoid unexpected rain and theft, the bulbs should be removed from the field and cured in a well ventilated shed similar to that suggested by Wiles (1992). There is a danger of sunburn if bulbs are dried in full sun.

On large farms in South Australia, the onions are allowed to cure naturally in the field for about 4 weeks after 90% leaf fall. The crop is then lifted with a skimming blade, windrowed and allowed to dry completely (2 to 3 days). Well dried bulbs are placed in bulk bins for further storage in an open shed. Artifical dehydrators are used if onions are not dry at harvest.

In may large commerical farms, the trend nowadays is towards the use of articifical drying facilities to cure

onions in storage.

In PNG as reported by Wiles (1992), onions may be stored for at least 2 months but observations at Laloki showed that onions, if cured properly, can store well even after two months under normal conditions. However, storage life is determined by Climate, Soil, Cultural Practices and Variety.

MARKETING

After curing and sorting, the bulbs must be packed in 20 kg onion bags. In Port Moresby most retail outlets will buy onions at K1 per kilogram, if direct contact can be made with the retailers. On the other hand wholesale outlets will buy in bulk but the prices offered may be low. Small quantities of onions can also be sold at the fresh food market outlets but the process is time consuming.

An average marketable yield of 29 tonnes per hectare was recorded at Laloki. Wiles (1992) estimated that yields of about 20 tonnes per hectare are possible under farmers' field conditions. The production costs estimated per hectare amounts to K4,640. At a purchase price of K450 per tonne, the net return for the farmer will be K4,360 per hectare.

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