HORTICULTURE NOTE NO. 28

TOMATO PRODUCTION IN THE LOWLANDS OF CENTRAL PROVINCE

JOHN W. SOWEI, Agronomist, Department of Agriculture and Livestock, Laloki Agricultural Research Station, P.O. Box 417, Konedobu, NCD,Papua New Guinea.

ABSTRACT

Tomato is a potential cash crop for the growers in the lowlands of Central Province (CP). The area is ideally located with good market access to Port Moresby and premium quality fruits command a high price on the fresh market. However, production fluctuates between seasons and is best in July-November and all season production is possible. Seeds of hybrid varieties are expensive. Therefore, a variety trial was conducted at Laloki Agricultural Research Station to evaluate some hybrids against standard varieties to see how well they perform under local conditions. Under favourable conditions and good cultural practices, one hybrid tomato plant can produce 6.40 kg of fruit, valued between K12.80 and K15.36.

INTRODUCTION

Tomato fruit is a highly prized commodity for fresh market consumption in Port Moresby. Figures available from a model farm showed that the best returns for investments in the descending order are tomato, followed by capsicum and cabbage (Sowei 1993 a).The good prices offered for tomato have resulted in an increase in the number of small scale vegetable growers in Central Province. There are no indications of increased production which might reduce the price and increase consumption. In the lowlands of Central Province tomato production is limited due to a distinct wet and dry season. The best quality fruits are produced during the dry season (June to November) where irrigation is used. During this time the hot days (21-28°C) and cool nights (15-20°C) are conducive for tomato growth. In-house tomato production during the wet season using polythene roof is another alternative to produce quality tomatoes. But very few farmers are using this system. For further details reference should be made to Horticulture Note No. 2 by Bull (1983). In the present note some general production practices are discussed with reference to potential varieties tested at Laloki Research station and at the demonstration farms in Tubuseria.

POTENTIAL VARIETIES

There are two types of tomatoes referred to as the determinate and indeterminate varieties. Determinate varieties are those that stop growing after a certain number of rodes (flowering) while the indeterminate varieties keep on growing and produce a series of flushes for a longer period of time. There are advantages and disadvantages of growing the determinate and indeterminate types. Bull (1983) suggested that it is usually best to grow determinate types but my experience is that almost all the tomato growers in the lowlands of Central Province prefer growing indeterminate varieties for the obvious reason, their high yields and longer fruiting period. The determinate types have a shorter production cycle and are generally lower yielding. However, determinate hybrid varieties such as Hawk and Solar Set trialed at Laloki produced very high yield of marketable fruits. Details of other varieties tested are given in Table 1. Variety Alafua Early is a determinate dwarf type (about 50 cm tall) which produces very small fruits. Other promising varieties include Tropic VF and Farmers 301 (Liu, per. comm.). In the Tubusereia area varieties such as Beefsteak, Money Maker, Summer Taste and Floradade have been grown successfully but yield records are not available. Bull (1983) released variety NG7536 (Island Red?) and also recommended Walter Improved from Yates, Australia. The former has some resistance to bacterial wilt, a serious root disease of tomato.

YIELDS

Fresh marketable fruit yields obtained in a variety trial at Laloki in 1993 are given in Table 1. Fresh fruit yield varies between varieties and types of tomatoes (determinate and indeterminate). Yields of 25 tonnes per hectare were reported by Bull (1983). Recent trials at Laloki Research Station by the author suggest that there is potential for increasing yields under good management and favourable environmental conditions. In fact earlier work by Bull and Blackburn showed:

Table 1. **Marketable Fruit Yield of Tomato Varieties Evaluated at Laloki**

Variety	Source	Type	Total Marketable yield (t/ha)*
Kingkong+	KnowYou Seeds,Taiwan	Indeterminate	93.57
Hawk+	New World Seeds, Australia	Determinate	87.25
Solar Set+	New World Seeds, Australia	Determinate	73.09
Alafua Large	Yates, New Zealand	Indeterminate	70.97
Grosse Lisse	Yates, New Zeland	Indeterminate	67.29
Island Red	Yates, New Zealand	Determinate	64.00
Alafua Winner	Yates, New Zealand	Determinate	54.00
Alafua Early	Yates, New Zealand	Determinate	43.5

+Hybrids, *Total marketable yield for 20 harvests

(1) that high yields are obtained in the dry season;
(2) yields declined due to nematod damage under continuous productions.

PRODUCTION

Raising Transplants

Tomato seeds are very small and therefore should be raised in the nursery before transplanting. To raise good seedlings make sure that proper nursery techniques are followed - types of pots to use, nursery shade, fertilizers in potting mix, watering, hardening and when to transplant. For details of establishing seedlings in the nursery reference should be made to Horticulture Note Number 24 by the author in Harvest Volume 15 No. 2. Copies can be obtained from The Distribution Officer, DAL, Publications and Information Section, P.O. Box 417, KONEDOBU.

Transplanting

Tomato seedlings should be ready for transplanting after about 5 full leaves have developed (usually 4 weeks after sowing). At this stage the seedlings should be about 20 to 30 cm tall. Seedlings raised under heavy shade (50-75%) should be hardened for about 1 week before transplanting. Hardening is a process where seedlings are exposed to direct sunlight for a certain period each day. This process prepares the seedlings to cope well under direct sunlight after transplanting. In the lowlands of Central Province, transplanting should be done on a cloudy day or preferably in the late afternoon. During the dry season high day temperatures and low humidity can cause transplants to wilt very quickly if not watered. This may affect initial field establishment due to transplanting shock.

Field Preparation

Field plots should be prepared to a fine tilth. To cater for furrow irrigation (preferred method of irrigation), furrows should be constructed to allow flow of water from one end of the field to the other. For details of farm layout and furrow construction reference should be made to Horticulture Note No. 24 by the author in Harvest Volume 15 No. 2.

Irrigation

Different systems of irrigation are available for use but the common systems used in the lowlands of Central Province are the sprinkler and quite recently the furrow irrigation system. The latter is preferred for tomato production. Sprinkler irrigation system is expensive to instal and maintain, and may aid in the spread of fungal diseases. Most importantly it disturbs the pollination of tomato flowers, therefore affects fruit set and the subsequent yields. Upon ripening the fruits may also split if sprinkler irrigation is used.

The best quality tomatoes are produced during the dry season using furrow irrigation. Without furrows some growers have used rubber hose which is connected from a main water pipe. The disadvantage is that it is not a convenient way of irrigating a large field of tomato. The pressure exerted from the main pipe can be so high that the soil around the base of the plants is eroded, taking with it any fertilizers which may have been applied.

Staking/Trellising

Staking is required for indeterminate varieties of tomato such as Tropic VF, Farmers 301, Kingkong and Grosse Lisse. Pruning of side shoots helps to control the plant, allows effective staking, good spray penetration and also produces large fruits. However, determinate varieties should not be pruned because this will decrease

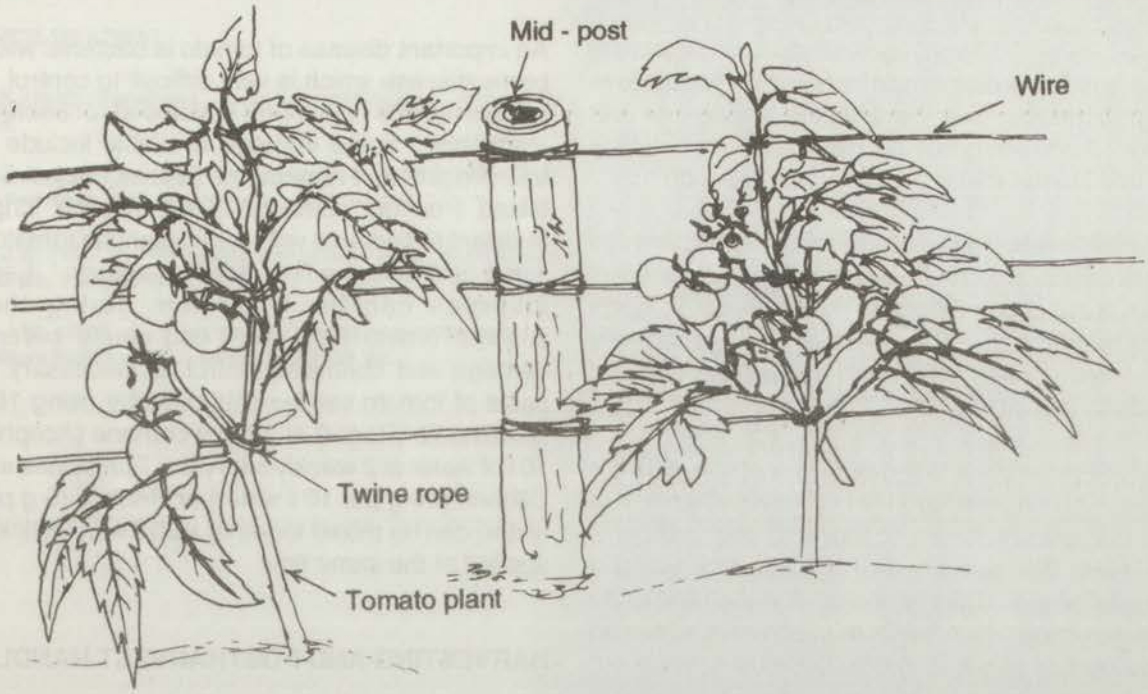

Figure 1. **A twin rope support Trellis**

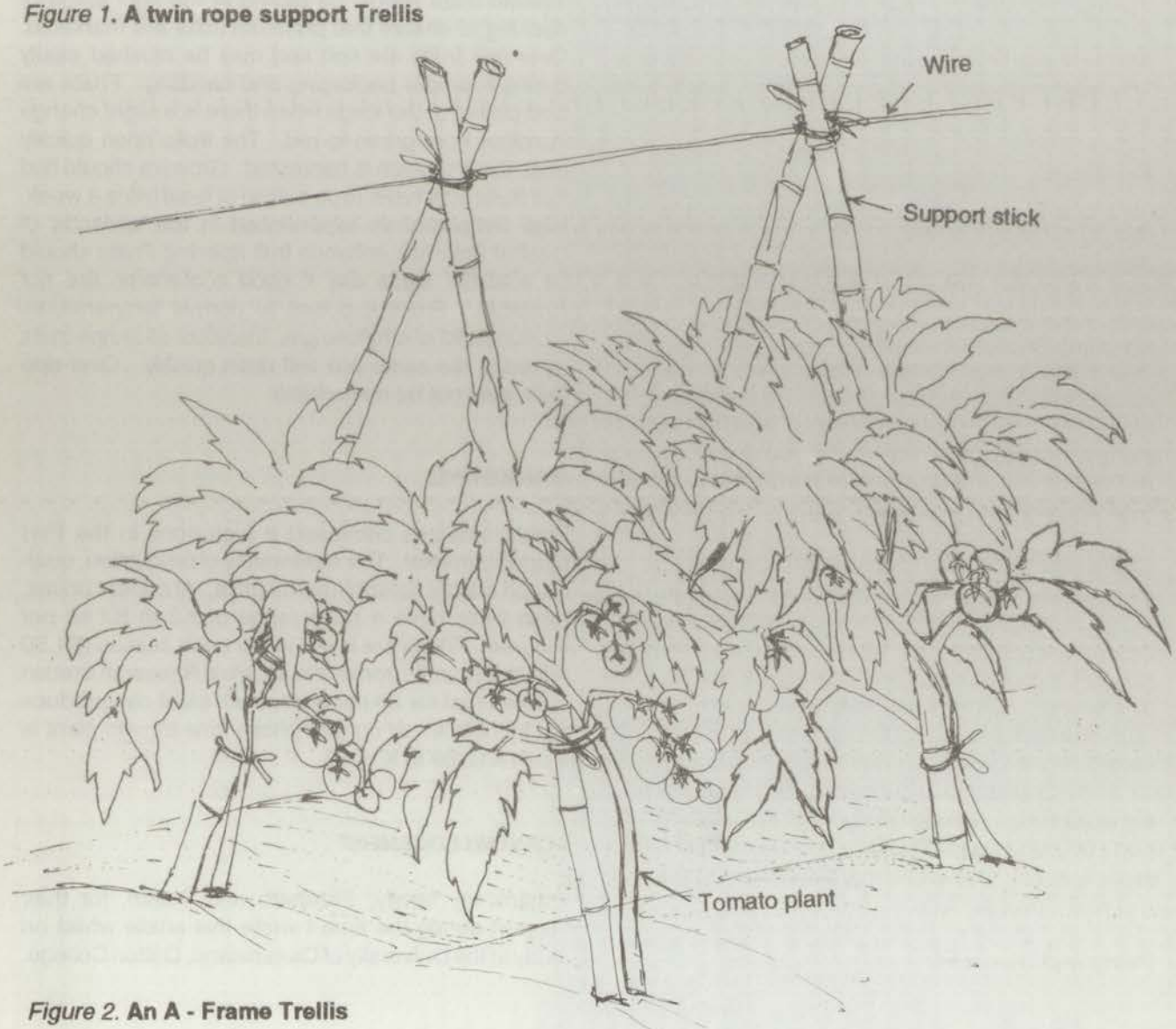

Figure 2. **An A - Frame Trellis**

fruit yield. Some determinate varieties do not require staking, therefore grass mulch should be used. However, fruit quality may be affected during the wet season. There are generally two methods of staking being used in the lowlands of Central Province.

(1) The first method is by using a trellis to which tomato plants are supported. In this method about two lines of wire strips are secured through three or four mid posts about 2 metres high. A piece of twine rope is carefully tied in a spiral fashion around the plant and directed upwards to the wires and secured (see Fig. 1).

(2) The A-Frame trellis is the second method of trellising tomato plants (see Fig 2). In this method a piece of wire is secured on three or four mid posts about 2 metres high. Alternatively, the uprights (sticks) can be driven into the ground firmly enough and then tied to the cross pole on top. If available, mangrove sticks can be used as uprights for a long time because they do not decay quickly. Be careful not to spread soil borne diseases from the last crop. If the field formerly carried an infected crop clean the bottom ends and dip in a fungicide mix before using for trellising another crop. This method is used where sufficient sticks are available.

Fertilizers

Inorganic fertilizers such as NPK and urea are available and can be purchased. In fertile soils fertilizers may not be required during the first cropping. However, we should always keep in mind that vegetables are great consumers of soil nutrients. This means that every time a crop is harvested, certain amounts of nutrients are removed from the soil. To be able to grow another crop, nutrients have to be replaced by applying inorganic or organic fertilizers. Organic fertilizers such as chicken manure (layers) are readily available at a minimal cost from the poultry industry in the area.

Transporting chicken manure may be a problem. Chicken manure should be incorporated into the soil before planting. Sprinkle some NPK fertilizer only at the base of the planting hole. After transplanting irrigation should be applied especially when fertilizers are used at planting. Some plants may be affected from the burning effect of fertilizers if irrigation is not applied. The recommended rate of fertilizers at planting is 500 kg/ha 12:12:17:2, about 30 g per plant. At four weeks after transplanting, a side dressing of 500 kg/ha 12:12:17:2 and 200 kg/ha murate of potash (potassium chloride) is applied so that each plant receives about 30 g and 15 g of respective fertilizers.

Pests and Diseases

An important disease of tomato is bacterial wilt, a soil borne disease which is very difficult to control. Many tomato hybrids have been developed for bacterial wilt resistance. Some varieties available include Tropic VF, Kingkong, Farmers 301, Hawk, Solar Set and Island Red but some of these may no longer be resistant to bacterial wilt. Avoid planting tomato in the same field after the first cropping season. Leaf spot diseases can be a problem during the wet season. Tomato fruit worm can cause severe fruit damage and chemical control is necessary. Other pests of tomato can be controlled by using 10 ml of Dimethoate (Rogor) or 20 g of Orthene (Acephate) to 10 l of water at 2 weekly intervals. Fungicides such as Dithane (20 g per 10 l water) or Benlate (5 g per 10 l water) can be mixed together with the insecticide and applied at the same time.

HARVESTING AND POSTHARVEST HANDLING

Tomato fruits should be picked at the right stage of ripening to ensure that premium fruits are marketed. Over-ripe fruits are soft and may be crushed easily during improper packaging and handling. Fruits are best picked at the stage when there is a slight change in colour from green to red. The fruits ripen quickly once the first batch is harvested. Growers should find that fruits may have to be picked at least twice a week. High temperatures experienced in the lowlands of Central Province enhance fruit ripening. Fruits should be sold the same day if good cool-rooms are not available. Fruits exposed to normal temperatures produce a lot of ethylene gas, therefore all unripe fruits stored in the same box will ripen quickly. Over-ripe fruits may not be marketable.

MARKETING

Fresh tomatoes command a high price in the Port Moresby market. The seasonality of production, quality and supply determines the price. At current prices, fresh fruits have a price range of K2 to K2.40 per kilogram. Prices are lower in the peak season (K1.50 per kg.). Results from a trial at Laloki Research Station showed that for 20 harvests, each plant can produce 6.4 kg of fruit. At current prices, one tomato plant is worth K12.80 to K15.36.

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FURTHER READING

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