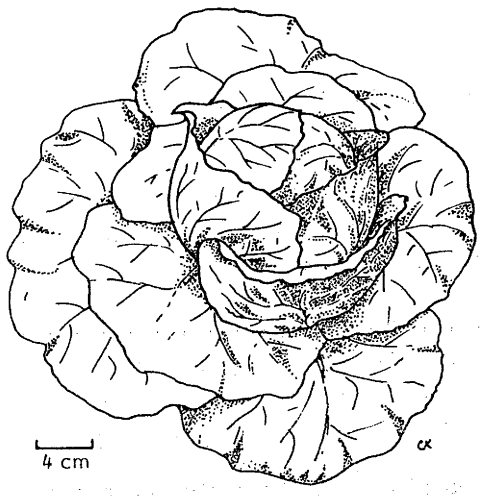
HORTICULTURE NOTE: NO. 3

CABBAGE

By P.B. Bull,* Senior Horticulturist, D.P.I., Laloki

Common Name: Cabbage or English cabbage

Botanical name: *Brassica oleracea* var capitata



A mature head of English cabbage

WHAT THE PLANT LOOKS LIKE

Cabbage is grown for its large firm heads of tightly packed leaves. The size and shape of the head varies in the different varieties. The leaves are usually grey green or green in colour, waxy smooth and crisp to cut.

WHERE IT GROWS

Cabbage probably originally came from the Mediterranean area. It was introduced into Papua New Guinea following European contact. It is grown all year round in both the lowlands and highlands. Cabbage grows best where the average daily temperature is 15-20°C. It will not usually grow if the average daily temperature is above 24°C, but heat tolerant varieties have been bred in Japan and Taiwan. These will grow well in the lowlands. In Papua New Guinea, heat tolerant varieties are not needed above 700 m.

Cabbage grows up to 2400 m above sea level in Papua New Guinea. It is very common in the highlands, particularly above 1800 m. Cabbage is frost tolerant.

SOILS AND FERTILIZERS

The best soil for cabbage is a deeply dug, rich sandy loam. For best results, plenty of compost should be mixed with the soil to hold moisture during dry weather. The soil pH should be between 6 and 7. Growing cabbage on raised ridges during the wet season improves the drainage.

Nitrogen is needed for good plant growth. Apply 200 kg per ha of 12.12.17 fetilizer before transplanting. Follow this one month later with up to 100 kg per ha of urea.

VARIETIES

Heat tolerant varieties which grow well in the lowlands are:

Tropic
KK Cross
KY Cross
YR Summer 50
Express Cross 60

These varieties will also grow in the highlands, although other varieties are normally used.

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Varieties which grow well in the highlands include:

Jubilee hybrid
Grey green hybrid
Greengold hybrid
Copenhagen market
Yates early drumhead
Succession

Many other varieties are available in the highlands, and some of these may also be suitable.

HOW IT IS GROWN

Propagation

In the lowlands, cabbage is grown from seed. To sow 0.1 ha with cabbage you need 25 g of seed. There are 3000 seeds in 10 g.

When the old cabbage stem is left in the ground after harvesting, side shoots grow. In parts of the highland and mid-altitude zones, these side shoots are planted instead of seed. When they are about the size of a cricket ball, they are broken off the old stem and planted so that about 4 cm remains above ground level.

Sowing

Seed can be sown into Jiffy 7's, plastic cups or trays. Sow two seeds per hole and thin to one after 7 to 10 days.

Transplanting

Transplant after 4 to 5 weeks, when the seedlings have 4 true leaves.

Seed sowing, nursery care and transplanting are described in Farming Note No. 10, Vegetables.

Plant spacing

Prepare ridges 1.2 to 1.3 m apart before transplanting. Two rows of plants 40 cm apart are planted down each ridge. Space plants 40 cm apart along each row.

Irrigation

During periods of low rainfall the crop should be irrigated once or twice every week. Either spray or flood irrigation can be used.

Weeding

The crop should be kept free of weeds by hand weeding or hoeing between the plants and between the rows.

TIME TO MATURITY

From transplanting, cabbage takes 2 months to maturity in the lowlands and about 3 months in the highlands.

From one sowing a crop of cabbage will mature over 2 weeks in the lowlands and about 3 weeks in the highlands. To grow cabbages to supply the market all the time, a new crop should be sown every 2 weeks in the lowlands and every 3 weeks in the highlands.

HARVESTING, STORAGE AND YIELDS

Harvest cabbage when the head fills out and feels hard, but before it starts to split.

Cabbages will keep for up to 1 week after harvesting, if they are put in a cool dark and well aired place. If they are left in a pile with no ventilation, they will go bad very quickly. Never store or transport cabbages in plastic bags such as old rice or flour bags. Use ventilated boxes, net bags or light weight Hessian sacks. In a cold store at $0^{\circ}C$ and high humidity, cabbages can be kept for 2-3 months. Do not freeze cabbage.

In the lowlands, yields range from 1 to 3 kg per square metre. In the highlands, yields range from 3 to 5 kg per square metre.

One reason that cabbage has become popular in Papua New Guinea is because it is not as liable to damage during transport as other leafy green vegetables.

HOW IT IS USED

The main food value in cabbage is Vitamin C and iron. Vitamin C is easily destroyed by cooking and is washed away by water. Do not use a lot of water for cooking. The

best method is to wash the leaves in the cooking pot, pour off the excess water, cover the pot with a tight fitting lid and cook for 3 to 5 minutes. Eat as soon as possible after cooking. Nutrients are destroyed in food kept hot after cooking.

INSECT PESTS

The major problems in growing cabbage are the leaf eating caterpillars, diamond back moth (*Plutella xylostella*) and cluster caterpillar (*Crocidolomia binotalis*).

The larvae of these insects eat the leaves of all the cabbage family. The diamond back moth grows faster at warmer temperatures, so it is a bigger problem in the lowlands than in the highlands. Because new larvae grow so quickly, spraying plants with an insecticide does not always give good control of the insect. Particularly in the lowlands it is best to grow just one crop of the cabbage family, then remove and compost, bury or burn all the old plants before sowing seed for a new crop. The new crop should be planted on different ground.

Spraying every week with Orthene 75% SP (7 ml per 10 litres of water) or Ambush 10% EC (1.3 ml per 10 litres of water) is recommended for control of both these insects. Do not harvest cabbage less than 3 days after using these sprays.

Diamond back moth is discussed in Entomology Bulletin No. 8. (HARVEST, Volume 8, No 1).

Soil insects can do a lot of damage to cabbage. These include cut-worms, crickets and taro beetles. They can be controlled with a spray of DDT (mix 40 g DDT 25% in 10 litres of water) or Lindane (mix 13 ml of Gammaphex 16% EC in 10 litres of water). This recommendation will be changed soon. This note will be reprinted when results of research are available

Apply the spray as a soil drench before planting or around the base of young seedlings, not to the plants themselves.

Cutworms are discussed in Entomology Bulletin No. 7. (HARVEST Volume 8, No. 3) and Taro beetles in Entomology Bulletin No. 29 (HARVEST Volume 10, No. 1).

Other insecticides which can be used on cabbages are listed by Thistleton (1983).

DISEASES

Black rot (*Xanthomonas campestris*) is a bacterial disease which can be serious, particularly in the wetter parts of the country. It attacks many species of the genus *Brassica* including English cabbage, Chinese cabbage, cauliflower, broccoli, Brussels sprouts, turnips and radish, as well as a number of weeds. Severe losses do occur in Papua New Guinea particularly in the lowlands.

On cabbage seedlings, cotyledons turn black along the edges and fall off. On mature plants the most common symptom is the appearance of small V-shaped wilted areas at the edge of a leaf. Small veins in the affected area turn black and the wilted area becomes yellow. Eventually the whole leaf will wilt. Often the diseased tissue is attacked by bacteria which cause soft rot.

The bacteria are carried on the seeds, and have been known to survive for up to 3 years.

The disease spreads from plant to plant by splashing from rain, running water from irrigation or by insects.

The most effective way to control black rot is to use only disease-free seed. Doubtful seeds can be soaked in water at a temperature of 44.5°C for 15 minutes. However, it is important to get the temperature exactly right. Slightly higher temperatures or longer soaking may kill many seeds. Seed should be sown as soon as possible after treating.

Bacterial soft rot (*Erwinia caratovora*) can cause considerable post harvest losses. Do not cut diseased heads in the field as infection will spread from the cutting knife. If a diseased head has been cut, disinfect the knife with household bleach or methylated spirits before using it on healthy cabbages.

For further information about Bacterial soft rot, see Plant Pathology Note No. 18,

(HARVEST Volume 8, No. 3).

FURTHER READING

Farming Note No. 10, *Vegetables*. Department of Primary Industry, Port Moresby. Revised, 1982.

Thistleton, B.M. (1980). Entomology Bulletin No. 8. Control of diamond back moths in brassicas. *Harvest* 6 (2): 91-93.

Thistleton B.M. (1983). *Recommendations for the Control of Pests*. Technical Report 83/4. Department of Primary Industry, Port Moresby, 1983.

Thistleton, B.M. (1982). Entomology Bulletin No. 7. Protection of seedlings from cutworm damage. *Harvest* 8 (3): 131-133.

Thistleton, B.M. (1984). Entomology Bulletin No. 29. Taro beetles. *Harvest* 10(1): 32-35.

Tomlinson, D. (1982). Plant Pathology Note No. 18. Bacterial soft rot of vegetables. *Harvest* 8(3): 141-144.

FURTHER INFORMATION

For further information and advice on vegetable growing contact the Area Horticulturist in your region. The addresses for the Area Horticulturists are as follows:

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Copies of this Horticulture Note can be obtained from: The Publications Officer, Publications Section, D.P.I., P.O. Box 417, KONEDOBU.