SOYA BEAN CULTIVATION IN THE MARKHAM AND RAMU VALLEYS

By Rosa Kambuou, Agronomist
Agriculture Research Centre, Bubia

INTRODUCTION

Soyabeans are a high protein food source and are being grown in increasing quantities in many countries of the world. Experimental work on this crop in Papua New Guinea began in 1973 at the Agriculture Research Centre, Bubia and has led to a series of recommendations for growing soyabeans in this country. This article gives the latest set of recommendations based on the results of trials carried out in 1978.

VARIETIES

Gilbert, Daintree, Ross, K39, 71-39 and Improved Pelican are currently recommended for the lower and middle Markham Valley. However, Improved Pelican is susceptible to a leaf disease, bacterial pustule *Xanthomonas phaseoli*, which may become a problem in large plantings.

Varieties currently recommended for the upper Ramu areas are P6, 71-39, K39, K123 and K12.

Unfortunately, these varieties are not used commercially in Australia and so seeds have to be multiplied in Papua New Guinea. A limited amount of seeds of each variety can be obtained from the Agriculture Research Centre, Bubia.

Part of the 1977 series of trials

PLANT PRODUCTION

For commercial plantings a population of around 360 000 to 400 000 plants per hectare is desirable. A lower population, about 200 000 to 360 000 plants per hectare, is sufficient for smallholder planting. Row

*This information was first published by the Agriculture Research Centre Bubia in their Information Bulletin No. 35.

TABLE 1. SOYABEAN SEEDING RATES

Variety	No. of seeds per kg	Weight of seed needed to give a plant density of		
		200 000/ha kg	300 000/ha kg	400 000/ha kg
P6	5 800	58	87	115
Improved Pelican and K123	7 300	45	68	92
Daintree	8 000	42	63	83
71-39 and Gilbert	8 600	38	58	78
Ross, K39 and K12	9 200	37	55	73

spacings will depend largely on the methods of weed control and the equipment available on the farm. If mechanical weed control is to be used, then a row spacing of 70 cm with plants every 4 to 5 cm in the row would be ideal. In areas where weeds are unlikely to cause a problem, a closer row spacing should be used. Also use a closer row spacing if pre-emergence herbicides will be applied. For the Gusap area a closer row spacing of about 40-50 cm is an advantage as this is likely to give better plant heights.

Seeding rate will vary according to seed size and the population desired. Table 1 gives the seeding rate (kg/ha) needed to produce three different plant populations. This is on the assumption that 60% of the seeds will establish.

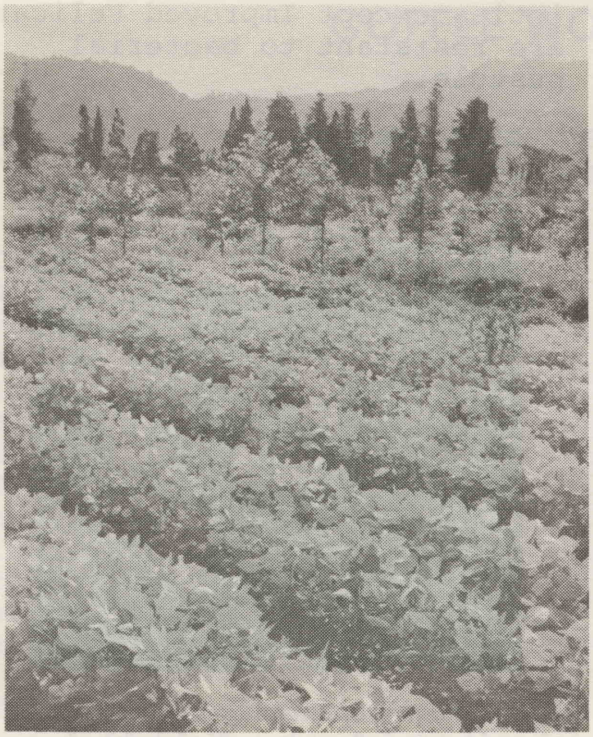
SEED TREATMENT

Soyabean seeds lose their viability quickly in lowland conditions. They can be stored at room temperature for only three weeks, and in air conditioned rooms for up to 6 months. In lowland environments, seeds should be kept in air conditioned rooms or in dry stores if available.

Seeds have to be inoculated before sowing on newly cleared land or on land that is new to soyabeans (see article on pages 236-238 in HARVEST 5(4)). Agar inoculum can be obtained by writing to the Chief Plant Pathologist, D.P.I., P.O. Box 2417, Konedobu. Peat inoculum is obtained from Australian seed companies. Directions on the use of inoculum are always enclosed with the packets. Keep the inoculum in the refrigerator or in an air conditioned room until use. Use agar inoculum within four weeks of receipt. If inoculum is to be used, seeds should not be treated with fungicides as this may prevent nodulation.

LAND PREPARATION AND SOWING

The planting area should be as flat as possible to make harvesting easier. Before sowing, the soil should be well ploughed and rotavated. For small



A field of soyabeans

farms, digging with hand tools is necessary. Planting depth should not be more than 5 cm in heavier soils, and 8 cm in light soils. Avoid waterlogged or swampy areas.

SOWING DATES

Seeds should be sown just after the onset of rain so that there is sufficient moisture for germination. The whole valley experiences the north-west monsoon which comes around December and lasts to March. The south easterlies set in from about July to October and fall mainly around the Huon Gulf extending to the Erap/Marambung area. Since different sites in the valley receive rain at different times, the following sowing dates are suggested:

Erap/Marambung area - early January; Sasiang/Leron/Mutsing area - late January/early February; Kaiapit/Gusap/Dumpu area - mid February/early March.

However, as the rainfall pattern varies from year to year, in some years the rain may set in earlier or later than stated.

FERTILIZER

More plant nutrition work is required, especially on poorer soils. However, for newly cultivated soils or soils that were previously under grain crops, we suggest that farmers use 2-3 bags of ammonium sulphate per hectare (20-30 kg/ha N) to get reasonable results. In areas of low phosphorous status, 1-2 bags of superphosphate (25-30 kg/ha P) should be used.

WEEDS

It is important to control weeds immediately before and after the soyabean seedlings emerge. Cultivation to control weeds is necessary until the plants are large enough to shade the soil sufficiently to keep weed growth down. Two interrow cultivations may be needed for this.

In areas where annual grasses such as *Rottboellia* are a major problem, the herbicide Treflan (trifluralin) can be used. In North Queensland, Treflan is applied pre-planting at the rate of 0.6-1.0 *l*/ha of product and must be incorporated into the soil immediately after application, to a depth of about 5 cm. Where broad-leaved weeds are the main problem, Afalon (linuron) applied before emergence of the crop, at about 2 kg/ha of the product, may prove useful. All these suggestions are based on North Queensland findings which are reasonably applicable here. Herbicides alone may not satisfactorily solve the weed problem, however, and inter-row cultivation may be necessary for effective control.

INSECT PESTS

Most pest damage of soyabeans occurs in the fruit maturation stage, although sometimes leaf eating beetles can cause extensive damage to developing shoots and flowers. The main species responsible are the leaf eating ladybird *Henosepilachna signatipennis*, and a small brown bettle, *Rhyparida coriacea*. Both can be easily controlled by the application of 0.1% carbaryl or malathion.

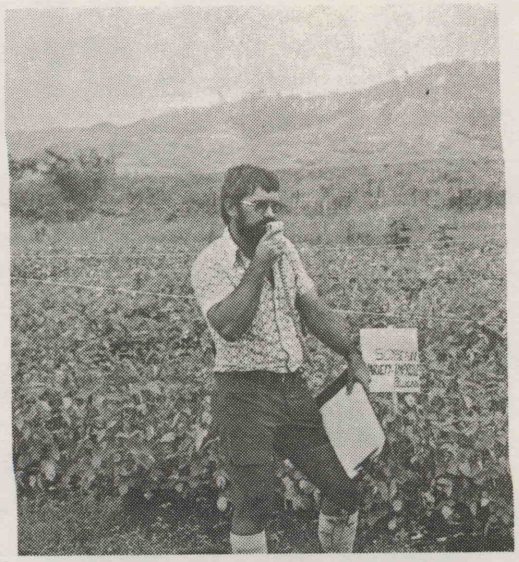
In the fruit maturation stage, the pod suckers *Nezara viridula* and *Riptortus annulicornis* can cause serious damage. Methomyl at 0.3 kg a.i./ha, accephate at 0.5 kg a.i./ha, formothion at 0.5 kg a.i./ha or permethrin at 0.1 kg a.i./ha should give some control over these pests.

Heliothis armigera and *Spodoptera litura* may occasionally be found in large numbers on soyabean. Methomyl, acephate or permethrin at the above rates can be applied if control is thought necessary.

DISEASES

To date, disease has not been a problem, but some will no doubt occur if more commercial plantings are estblished. The main leaf disease present in the valley is bacterial pustule. Infestation is not severe and it only attacks a few varieties.

All currently recommended varieties except Improved Pelican are resistant to bacterial pustule.



Jim Sumbak explaining about plant density trials at a field day

FUTURE WORK

Varietal studies will continue at Marambung, Leron and Gusap. Some promising lines from the Asian Vegetable Research and Development Centre (AVRDC) in Taiwan will be tested against our standards.

A herbicide trial will be carried out at Bubia, to screen various herbicides on a *Rottboellia* infested block and then to select the most effective of them for formal testing in the valley next season.

Re-evaluation trials will be established at Leron, Gusap and Bubia.