that inadequate pre-cooling prior to packing was the most common cause of problems later in the handling chain. Ms Janine Jaeger, of Agriculture Victoria, visited in September 1998 and baseline data of naturally occurring microbial populations of snake beans and bitter melon were evaluated. Data suggested a high level of variability in separate samples but within the normal ranges for vegetables.

Changes in microbial populations due to temperature are being studied in conjunction with temperature logging this year. Several information kits about cool room use, post harvest handling and transport of vegetables have been produced as part of this project. Many thanks to Territory Produce Freight Management and growers who have been involved in this project.

5.1.9 EFFECT OF TEMPERATURE AND PACKAGING ON THE SHELF LIFE OF BITTER MELON AND OKRA

M Gosbee and S Marte

These experiments were performed to examine the effects of four types of packaging on the shelf life of bitter melon and okra when they were stored at different temperatures. This continues previous work on other Asian vegetables. The vegetables were packed in boxes with either a plastic bag, perforated plastic bag, peak-fresh bag or just with newspaper lining, and stored at 5, 10, 15 and 20°C and 95% RH. Weight loss and quality scores were recorded twice weekly to determine shelf life. Other parameters also noted included chilling damage, rots, ripening and colour changes.

Bitter melon had the best storage life of 23 days when stored at 5°C. However it developed chilling injury at this temperature. Okra had the best storage life at 10°C.

Table 1. Optimum storage conditions for bitter melon and okra

	Bitter Melon	Okra
Packaging	Perforated bags	Plastic bags
Temperature	10°C	10°C
Storage Life	14 days	24 days

As expected, the rate of water loss was strongly affected by packaging. Produce packed in newspaper lost the most water, and would not be recommended particularly in low humidity cool rooms. While plastic bags reduce water loss, they keep in the heat. Perforated bags are the best option. No advantage was gained from the peak-fresh bags. Thanks to Territory Produce Freight Management and Amcor for supporting this work.

5.1.10 BITTER MELON HARVEST MATURITY

M Gosbee and S Marte

Aim
To develop harvest maturity stages that optimise post-harvest storage life, minimise ripening in transit and maximise final eating quality to the consumer.

Method

About 8 to 10 bitter melons were harvested at three time periods: 15-16 days, 18-19 days and 22-23 days after flowering. Each melon was assessed for a series of parameters shown in Table 1 to determine if any of these characteristics could be used as a harvest index. Additional melons were also harvested to determine the effect of harvest time on shelf life. These melons were wrapped in perforated bags and stored at 5, 10 and 15 °C.

Results - Quality

Table 1. Descriptive parameters of bitter melon harvested at different intervals from flowering

	Harvesting Stage (days after flowering)					
Parameter	15-16		18-19		22-23	
Firmness Score (1 = firm, 5 = soft)	1.3 ±0.15	a	1.5 ± 0.16	a	1.5 ± 0.16	a
Penetrometer (kg/5mm probe)	4.9 ± 0.07	ab	5 ± 0	a	4.6 ± 0.13	b
Colour Score	1.5 ± 0.3	a	2.1 ± 0.3	a	1.9 ± 0.3	a
Weight (g)	276 ± 7	c	359 ± 17	b	528 ± 21	a
Length (cm)	23 ± 0.9	b	23 ± 0.6	b	29 ± 0.8	a
Diameter (cm)	6 ± 0.2	b	6.4 ± 0.2	b	7.4 ± 0.2	a
Width of bump (mm)	6.4 ± 0.2	b	7.0 ± 0.3	b	8.6 ± 0.3	a
Height of bump (mm)	6 ± 0.2	b	6.2 ± 0.2	ab	7.2 ± 0.2	a
Starch (%)	69 ± 9	a	55 ± 7	a	69 ± 5	a
Acid (mmol H+/100 ml)	1.22 ± 0.07	a	1.27 ± 0.04	a	1.29 ± 0.06	a
Brix	3.4 ± 0.14	a	3.15 ± 0.08	a	3.4 ± 0.13	a

Values are means followed by standard error. Values followed by different letters within rows are significantly different ($P<0.05$).

No one measure satisfactorily distinguished between the categories. Starch, acid and brix were all similar ($P>0.05$), which is what would be expected, as the fruit were all harvested before ripening changes took place. Firmness, bump height or width and diameter were distinguishable between some but not others. Weight was the only parameter, which was significantly ($P<0.05$) different. However this would be affected by nutrition, irrigation, temperature and other factors and would not be a suitable maturity index.

Development of the seeds seems to offer the best prospects for distinguishing over mature melon from immature. This however is still destructive, and affected by environmental conditions.

Results - Storage

Both storage temperature and the maturity of the melons affected the storage life (Table 2). Greatest storage life is achieved when melons are picked immature or on maturity rather than over-mature, and stored at 5°C. However bitter melon stored at 5°C can develop chilling injury. If fruit are picked over-mature, the benefit of low temperature storage is reduced. If fruit are stored too hot, the benefit of picking them smaller is also reduced. Considering that bitter melon is commonly stored at 10°C, the stage of picking has only a small difference of four days on storage life. But if the produce heats up, the shelf life rapidly reduces to 11 days, which is marginal.

Table 2. Storage life (days) of bitter melon harvested at different intervals from flowering.

	Storage Life (days)			
Days after flowering:	15-16	18-19	22-23	Temperature (average)
5°C	21.1	21.2	15.7	19.3 a
10°C	19.8	16.6	15.4	17.2 ab
15°C	17.5	13.5	11.7	14.2 b
Maturity (average)	19.5 a	17.1 ab	14.3 b	

Values of means followed by different letters are significantly different (P<0.05).

5.2.1 ASPARAGUS CULTIVAR EVALUATION

J Bright

Currently UC157 F_1 is the standard asparagus cultivar grown in northern Australia. The commencement of the 2nd International Asparagus Cultivar Trial provided an opportunity to obtain a wide selection of genetic material for comparison with UC 157 F_1 at Katherine.

Materials and Methods
Seed of 18 cultivars were sown and transplanted to the field in March 1998 (Table 1).

Table 1. Cultivars selected for evaluation at KRS

UC157F_1	Apollo
Grande	Boonlim
Tainan1	Cipres
Tainan 2	PLA-2232
Tainan 3	Atlas
JACQ MA 2004	JACQ MA 2014
Andreas	Venlim
Val Prima	PLA-2132
Larac	Dariana

Results and Discussion
Due to delay in field planting, results will be available in late 1999. The seed provided had very low germination rates and as a result a few plants only represent a number of lines and some lines are not represented at all. Currently the planting has been slashed and the spears will be harvested.

The disease anthracnose is a problem with asparagus in the Katherine region. In 1999, the cultivars will be inoculated with this disease in early September to screen the cultivars for resistance. The irrigation system in the block will be changed from drip tape to overhead sprinkler to encourage the disease.