EARLY YIELDS FROM DWARF x TALL COCONUTS EXPERIMENT

By R.M. Brook,* Coconut Agronomist, Bubia Agricultural Research Centre, Lae

INTRODUCTION

In Papua New Guinea, hybrid coconuts have been commercially distributed by the Hybrid Coconut Project for the past 5 years. The earliest ones planted are now bearing their first nuts. The type being sold in Papua New Guinea is a cross between a dwarf type called the Malayan Red Dwarf and a tall coconut from the Solomon Islands called the Rennell Island Tall. This cross was not fully tested in Papua New Guinea before its distribution by the Project. However, it was known from experiments in other countries, such as Ivory Coast and Solomon Islands, that hybrid coconuts could produce much greater yields than the tall types usually grown.

It was decided to begin distributing hybrid coconuts in Papua New Guinea before testing was complete for the following reasons:

1. A survey of coconut plantations in 1973 showed that almost half the palms were over 50 years old. Therefore widespread replanting was necessary.

2. Other copra-producing countries, such as the Philippines, Indonesia and Malaysia decided to replant with high yielding hybrid coconuts. If Papua New Guinea also replanted with hybrids there would be an improvement in yield. Hence the copra industry here would be able to compete alongside those in other countries.

3. It would have taken at least 10 years to test the hybrids. During that time, if increased world production caused copra prices to fall, it would be far more difficult for producers without the high yielding hybrids to continue making profits.

In general, tall coconuts are slow to begin bearing, but bear the large nuts that growers prefer. Dwarf coconuts, on the other hand, are short, come into bearing quickly (the first nuts are borne just over 3 years after field planting), and produce large numbers of small nuts. Experiments showed that hybrid crosses combined the best of these characteristics. The crosses bore large numbers of large nuts, and came into bearing quickly.

Before the distribution of hybrid coconuts in Papua New Guinea, one experiment had been started to evaluate hybrids and to compare them with the best tall varieties available. The experiment was begun in 1975.

This article describes some aspects of that experiment.

EXPERIMENTAL DETAILS

Five hybrid crosses and four tall varieties are being tested in this experiment. They are listed in Table 1, together with their place of harvest, date of seednut harvest and field planting date.

There are 2 experimental sites: The Lowlands Agricultural Experiment Station at Keravat, and Bubia Agricultural Research Centre, Lae.

---

* *Present address: Department of Agriculture, University of Newcastle-upon-Tyne, Newcastle-upon-Tyne, England*

TABLE 1. VARIETIES OF COCONUT PALM GROWN IN SPACING x VARIETY TRIAL AT KERAVAT AND BUBIA, WITH ORIGINS, HARVEST AND PLANTING DATES

Variety	Where obtained	Seednut harvest date	Field planting date (1975)	
			Keravat	Bubia
Malayan red dwarf x Rennell Island tall (MRD x RT)	Yandina, Solomon Islands	Nov. 1973	January	Feb.
Malayan red dwarf x Malayan tall (MRD x MLT)	Yandina	Nov. 1973	January	Feb.
Malayan red dwarf x Solomons tall (MRD x ST)	Yandina	Nov. 1973	January	Feb.
Malayan red dwarf x Gazelle tall (MYD x GT)	Ralabang Plantation, ENBP.	Jan. 1974	January	Feb.
Malayan yellow dwarf x West African tall (MYD x WAT)	IRHO, Ivory Coast	Sept. 1974	December	May
Rennell Island tall (RT)	Rennell Island, Solomon Islands	Nov. 1973	January	Feb.
Karkar Island tall (KT)	Bulu Plantation, Karkar I.	Nov. 1973	April	Feb.
Markham Valley tall (MT)	Riara Village, Markham Valley	June 1974	October	March
Gazelle Peninsula tall (GT)	Natava Plantation E.N.B.P.	Oct. 1974	June	Feb.

A full version of the experiment was planted at Keravat. Here, the palms were planted in 3 spacings:

1. 7.5 m triangle (205 palms/ha)
2. 8.5 m triangle (160 palms/ha)
3. 10 x 6 m hedge (167 palms/ha)

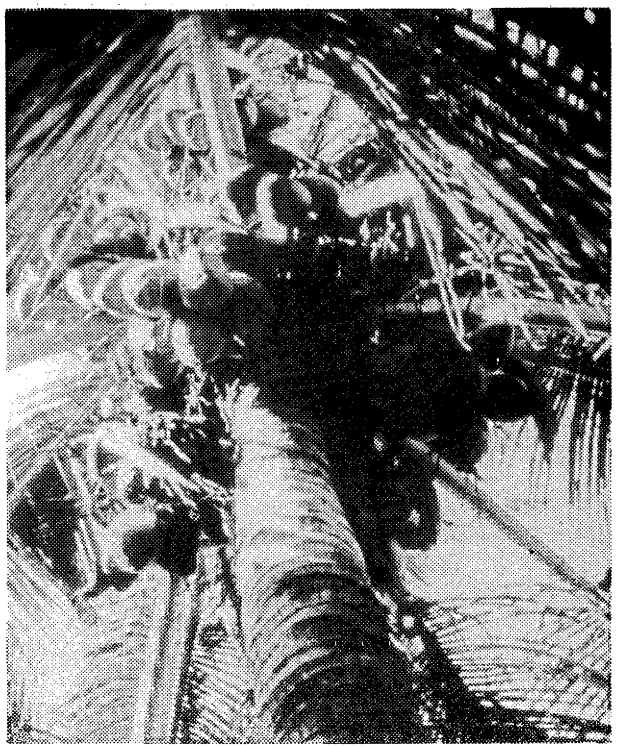
All 9 varieties were planted in each spacing. Two plots of each variety/spacing combination were planted. So there were 54 plots altogether. Each plot held 12 palms.

At Bubia, all 9 varieties were planted in plots of 12 palms, but in the 7.5 m triangle and 10 x 6 m hedge spacings only. Only 1 plot of each variety/spacing combination was planted. So there were 18 plots altogether.

The two triangular spacings were chosen as suitable for sole plantings (coconuts only). The 10 x 6 m hedge was chosen as suitable for underplanting with cocoa.

A ground cover of *Pueraria javanica* was established. All palms were ring-weeded.

At Keravat, the palms were fertilized every



The photograph on the left shows a tall coconut palm, of the type traditionally grown in Papua New Guinea. The photograph on the right shows a dwarf x tall hybrid bearing a typical heavy crop of coconuts

6 months with 0.75 kg ammonium sulphate and 0.75 kg sulphur. At Bubia, until August 1980, each palm received 0.6 kg ammonium sulphate every 6 months. After August 1980, the dose was changed to 1 kg potassium chloride per year, plus 1.2 kg magnesamon and 1.5 kg ammonium sulphate every 6 months.

RESULTS AND DISCUSSION

The results given here include:

1. Only trees that survived beetle attack
2. The yields of copra for 1982
3. The total yields up to the end of 1982

Problems

There were several problems with this experiment:

At Keravat many palms died because of attacks by the New Guinea rhinoceros beetle (*Scapanes australis*), followed by the palm weevil (*Rhyncophorus bilineatus*). These pests are not a serious problem at Bubia. Table 2 shows that there were great differences in survival of palms between variety and sites. RT was the most susceptible to attack, and GT was the most resistant to attack.

As a result of these deaths at Keravat, recording from 43 of the original 54 plots was stopped.

Palms at Bubia had a higher survival rate than at Keravat, but nut sizes were very small, possibly because of poor drainage and waterlogging of the soil.

At both Keravat and Bubia there were large numbers of rogue dwarfs in the MRD x ST and MRD x MLT plots. 'Rogue dwarfs' are hybrid seedlings that turned out to be dwarf palms. At Keravat, MRD x MLT could not be included in the results, because there were too many rogue dwarfs on the plots.

TABLE 2. SURVIVING HEALTHY PALMS AT KERAVAT AND BUBIA AFTER 6 YEARS GROWTH (Recorded in May 1981)

Variety	Keravat	Bubia
MRD x RT	47%	96%
MYD x WAT	58%	91%
MRD x ST	42%	77%
MRD x GT	59%	91%
MT	50%	92%
KT	54%	74%
RT	22%	83%
GT	67%	96%
Mean	49.9%	87.5%

It is not possible to compare the effect of spacing on the growth of the palms in this experiment because:

a) The many palm deaths at Keravat left many empty spaces on the plots.

b) At Bubia only one plot in each spacing/variety combination was planted. At least 2 plots of each are needed to make a comparison.

Therefore, the results given here only refer to the performance of the varieties. Rogue palms are not included in the calculations of yield.

Performance of the varieties

The Malayan Red Dwarf x Rennell Tall hybrid showed the most vigour from the start, and were the first to flower. At Keravat, at 24 months after field planting, 8% were flowering.

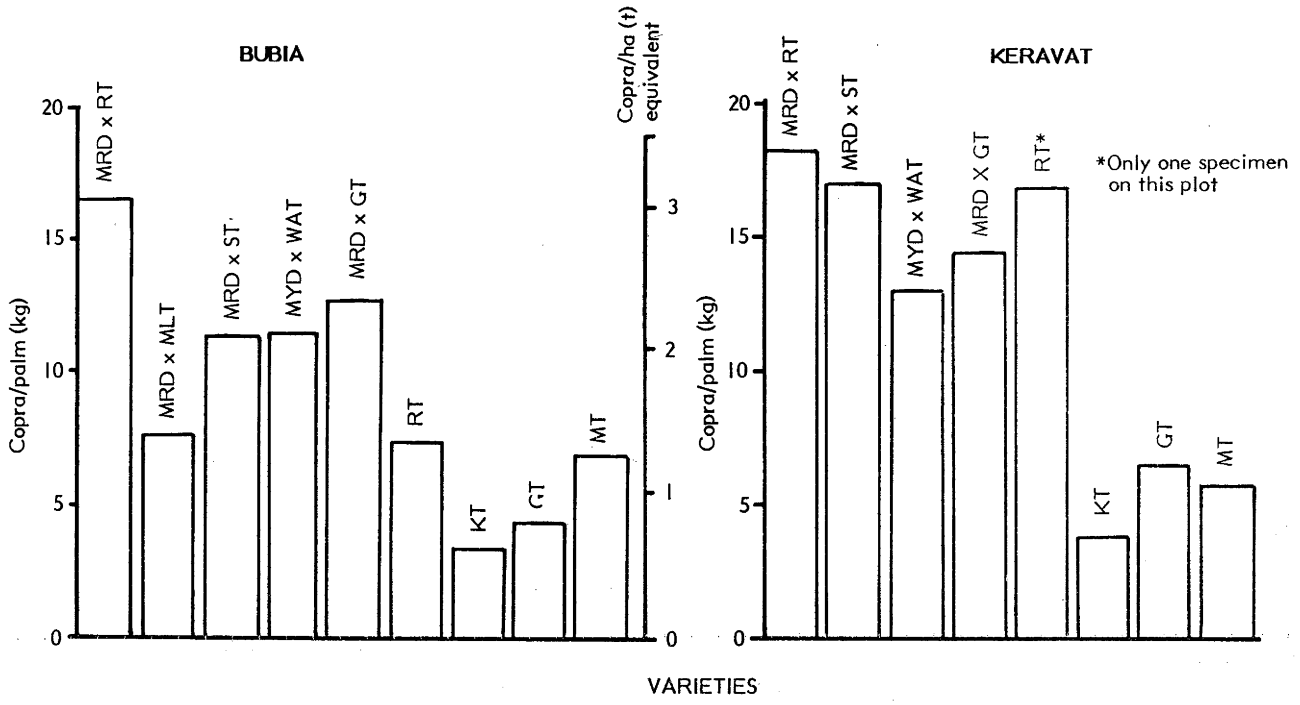
In 1982, all the hybrids gave larger yields than the tall coconuts. At both Keravat and Bubia MRD x RT had the greatest yields. MRD x ST and MRD x GT both appeared to be promising varieties, except for their small nut sizes (see Table 3). The high yield of RT at Keravat was because this was recorded from a single but heavily bearing palm.

The low yields from MYD x WAT compared with MRD x RT were surprising. In experiments elsewhere in the world, MYD x WAT has proved to be a very high yielding cross. It is the most widely grown hybrid variety in most other countries with large coconut replanting programmes.

Table 3 also shows the cumulative yields at Bubia up to the end of 1982 (i.e. yields from all the years added up). The yields are given in tonnes per hectare. MRD x RT was by far the most heavily cropping variety tested. This was because MRD x RT started to bear nuts just over 3 years after planting, and took only 5 years (from planting) to bear their first tonne of dry copra/hectare.

TABLE 3. CUMULATIVE YIELDS OF DRY COPRA AT BUBIA UP TO THE END OF 1982 AND NUT SIZES (DRY COPRA BASIS) AT BUBIA AND KERAVAT IN 1982

Variety	Cumulative yield (t/ha equivalent) at Bubia	Nut sizes in 1982			
		Bubia		Keravat	
		Copra/nut(g)	Nuts/t	Copra/nut(g)	Nuts/t
MRD x RT	11.08	160	6250	240	4170
MRD x MLT	3.74	138	7250	not represented	
MRD x ST	6.02	123	8130	185	5400
MRD x GT	6.20	128	7810	193	5180
MYD x WAT	4.41	125	8000	195	5130
RT	3.07	193	5180	249	4020
KT	1.57	155	6450	253	3950
GT	1.31	121	8260	206	4850
MT	2.94	187	5350	323	3100



Dry weight of copra per palm at Bubia and Keravat, with per hectare equivalent at Bubia, for 1982

By contrast, the best tall at Bubia, RT, took eight months longer to come into bearing and nearly seven years to bear the first tonne of copra/ha. In terms of cumulative yields, all the hybrid varieties tested out-yielded talls.

The diagram above shows that as annual yields are higher in all hybrid crosses compared with talls, this difference in cumulative yields will grow bigger as time goes on.

CONCLUSION

Although the Hybrid Coconut Project took a risk in releasing a hybrid cross which at that time had not been fully tested in Papua New Guinea, this experiment shows that the risk was justified. In terms of earliness of bearing, annual copra yield and cumulative yield, the MRD x RT hybrid was by far the best variety in this experiment up to the end of 1982 - nearly 8 years after planting.

For the grower, although this planting material may seem expensive at first, it will repay capital outlay more quickly than traditionally grown tall varieties. Also it will provide higher income per unit area of plantation.

There are a number of hybrid coconut demonstration blocks growing in all lowland provinces. Here you can see how good these coconuts are for yourself. Contact your Provincial Coconut Officer or your Area Coconut Officer via the National Crops Advisor (Coconut), D.P.I., P.O. Box 417, Konedobu.

FURTHER READING

Brook, R.M. (1982). The Hybrid Coconut Project in Papua New Guinea - its past, present and future. *Indian Coconut Journal* 12:3-8.

Thompson, P. (1981). Hybrid coconuts in Papua New Guinea. *Harvest* 7 (3): 121-125.