

GERMINATION AND SEEDLING PERFORMANCE OF SOME SELECTED COCONUT HYBRID CROSSES

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ABSTRACT

Dwarf coconut populations, namely: Orange Dwarf (OD), Coconiño (CCN), Lingkuranay (LKY) and Tacunan (TAC) were pollinated by controlled hand pollination technique with Baybay Tall (BAY) as the common male parent to study the hybrid vigor of the resulting hybrids. Compared with their corresponding female parents, seedlings of OD x BAY, CCN x BAY and LKY x BAY exhibited hybrid vigor in terms of germination rate, girth size, height, and time from shoot emergence to leaf splitting. In addition, leaf production rate was faster in OD x BAY and in CCN x BAY than their corresponding female parents. For TAC x BAY seedlings, the expression of hybrid vigor was evident only in height and girth size.

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KEY WORDS: Hybrid vigor. Controlled hand pollination technique.
Coconut hybrids. Germination and seedling performance.

INTRODUCTION

Selection of seedlings in the germination bed and nursery is usually based on two phenotypic traits, namely: rapidity of germination and vigor of the young plant. Hybrid vigor in F₁ hybrid is generally exhibited in size or rate of growth (Allard, 1960). Hence, seedling vigor can be considered in terms of early germination and/or rapid production of seedling leaves (Banzon and Velasco, 1982) and big girth circumference.

The phenomenon of hybrid vigor in coconuts was first observed by Patel (1937 as cited by Mathai, 1979) in crosses between tall variety as female parent and dwarf variety as pollen parent. Morphological characters like height, girth at collar and number of leaves were the criteria for ascertaining the degree of vigor of the hybrids. Since then, the manifestations or expressions of hybrid vigor in other hybrid combinations like typica x pumilla (Liyanage, 1960), tall x gabondam (Anon, 1961 as cited by Mathai, 1979), and typica x spicata

(Pieries, 1960) have been recorded. Mathai (1979) also observed heterosis on tall x dwarf and tall x gangabondam crosses.

This paper compares the seedling performance of some selected dwarf (female parent) x tall (pollen parent) hybrids with their respective female parents as check varieties and shows if hybrid vigor is evident in the four crosses made.

MATERIALS AND METHODS

The study was conducted at the coconut nursery of the Regional Coconut Research Center (RCRC), ViSCA, Baybay, Leyte.

Hybrid seednuts used in the study were derived from controlled hand pollination. A common male parent, Baybay Tall (BAY) was used. Seednuts of the dwarf cultivars, namely: Linkuranay (LKY), Coconiño (CCN), Tacunan (TAC) and Orange Dwarf (OD) were taken from palms utilized as female parents in the hybridization between tall x dwarf coconuts.

Sixty seednuts each of hybrid crosses LKY x BAY, CCN x BAY and TAC x BAY were used. For OD x BAY and OD, only 40 seednuts each were sown due to lack of planting materials. Moreover, 60 seednuts each of LKY, CCN and TAC were selected.

All seednuts were harvested at brown-ripe stage in just one day. To ensure purity of dwarf cultivars, only seednuts from within the plantation block were collected. Hybrid seednuts were derived from controlled artificial pollinations, hence, the

probability of getting inbreds was assumed to be nil.

The experiment was laid out using the completely randomized design (CRD) with three replications. Each replication had 20 seednuts per entry. For OD x BAY and OD, only two replications were used due to limited planting materials.

Each seednut was properly labeled and sown in the nursery or germination bed one day after harvesting. Neither seasoning (storage of seednuts) nor trimming (cutting a portion of the husk) was done prior to setting of seednuts in germination beds. Simultaneous setting of seednuts was done for both hybrids and dwarf cultivars.

Data on vegetative growth characters were gathered periodically soon after shoot emergence. Except for leaf production which was recorded every 2 months, the rest of the data were collected monthly. All leaflets in leaf number three were counted.

Data on germination were taken daily. As soon as sprouts emerge from the husk, the number of germinated seednuts and the date of sprout emergence were noted. Recording of germination data was continuous until exactly 2 months from sowing in the germination bed.

RESULTS AND DISCUSSION

Germination

The late and early germinators can be distinguished by the time it takes the shoots of the seednuts to emerge (i.e. from a day after harvesting). All hybrid seedlings except TAC x BAY showed significantly rapid germination rate as shown by the number of

days from sowing to shoot emergence (Table 1). The germination of inbreds was obviously delayed by about 30 days compared to their hybrid counterparts.

Most CCN x BAY seedlings germinated as early as 14 days after sowing. For CCN inbreds, the earliest emergence occurred at 35 days from sowing with the germination peak at 60 days. CCN x BAY hybrids and CCN inbreds can be clearly distinguished using their germination speed. Similarly, the germination of OD x BAY seedlings and OD inbreds; and of LKY x BAY and LKY seedlings greatly differed. This suggests that hybrid vigor is favorably operating in these coconut hybrid seedlings. However, this was not obvious for TAC x BAY seedlings because TAC seedlings were comparable to the hybrid seedlings in terms of germination rate.

Generally, hybrid seedlings showed higher percentage germination than the inbreds. At 2 months after sowing, the percentage germination of both OD x BAY and CCN x BAY was significantly higher than their corresponding female parents.

Based on the principle of Mather (1964), Fremond et al. (1966) claimed that rapidity of germination is positively linked to earliness of bearing. Results obtained in this study revealed the potential earliness of hybrids over the inbreds.

Growth and Development of Coconut Seedlings in the Nursery

Seedling Height. As early as 3 months from shoot emergence, OD x

BAY and CCN x BAY seedlings were significantly taller than the inbreds (Table 1). LKY x BAY and TAC x BAY seedlings were statistically comparable in height to the inbreds. However at 6 months after shoot emergence, seedlings of these hybrid crosses were significantly taller than the inbred seedlings.

Girth Circumference. Hybrid seedlings exhibited bigger girths than the inbreds (Table 1) which implies that hybrid vigor is favorably operating in the hybrids. At 3 and 6 months after shoot emergence, girth circumference of seedlings of the hybrid crosses was significantly bigger than their inbred counterparts except TAC x BAY and TAC. However at 9 months after shoot emergence, TAC x BAY seedlings showed bigger girth than the inbred.

Leaf Production. At 4 and 6 months after shoot emergence, the number of leaves produced by hybrid seedlings was significantly higher in OD x BAY and CCN x BAY crosses than in their inbreds. No significant differences were noted in the other hybrids and inbreds.

Rapid production of seedling leaves is another expression of hybrid vigor. Past correlation results indicate that trees with more leaves commence their reproductive phase earlier than palms with fewer leaves. This suggests that only OD x BAY and CCN x BAY crosses exhibit hybrid vigor in terms of leaf production.

Leaf Splitting Stage

Early leaf splitting is a desirable character because it indicates earli-

Table 1. Summary table showing the germination and growth performance of four hybrid crosses and their female progenitors.

Hybrid/ Cultivar	Days from Sowing to Shoot Emergence	% Germina- tion	Months from Shoot		Emerg- ence to Leaf Splitting	Girth Circumference (cm)			Girth Circumference (cm)			Leaflet Count	Leaf Production	
			3 mos	6 mos		9 mos	3 mos	6 mos	9 mos	4 mos	6 mos			
OD x BAY	27.6	80.6	5.9	8.8	12.9	14.2	82.3	128.7	146.0	55.7	4.7	6.4		
OD	59.9	30.6	6.4	7.8	11.8	13.3	71.8	96.1	106.1	51.3	4.1	5.6		
Level of Significance	**	**	**	*	**	ns	**	**	**	ns	**	**		
C.V. (%)	2.2	7.1	1.8	5.9	1.2	7.3	0.3	0.5	0.7	5.0	0.9	1.8		
CCN x BAY	32.7	63.3	7.5	8.2	12.2	14.1	75.6	121.3	144.1	41.9	4.5	6.1		
CCN	56.1	21.7	9.8	6.9	9.3	10.7	63.4	84.9	93.2	25.9	3.9	5.5		
Level of Significance	**	**	**	**	**	**	*	**	**	**	*	**		
C.V. (%)	12.3	23.0	4.5	4.6	2.7	4.0	6.6	2.4	8.6	11.1	5.4	2.1		
LLKY x BAY	28.6	58.3	6.3	8.3	11.3	13.1	76.1	112.1	128.7	48.1	4.6	6.2		
LLKY	46.3	86.7	7.2	7.0	9.8	11.0	77.2	95.3	110.5	43.8	4.1	5.7		
Level of Significance	**	**	*	**	*	**	ns	**	*	ns	ns	ns		
C.V. (%)	6.4	4.0	4.0	3.9	5.5	3.1	10.2	4.9	4.3	9.6	6.6	6.0		
TAC x BAY	41.0	75.0	6.3	8.5	8.5	12.0	14.2	76.8	107.8	135.1	37.5	4.4		
TAC	41.0	73.3	6.3	8.3	8.3	11.8	13.6	70.4	97.9	113.1	41.6	4.6		
Level of Significance	ns	ns	ns	ns	ns	ns	*	ns	**	**	ns	ns		
C.V. (%)	4.6	5.5	2.4	2.4	2.2	1.8	1.6	4.4	2.4	4.0	7.2	3.3		

ness of bearing. Standard practices in raising coconut seedlings in the nursery indicate that at leaf-splitting stage, seedlings are ready for field planting. The time from shoot emergence to leaf-splitting was significantly shorter in hybrid seedlings than inbreds indicating hybrid vigor. In the case of TAC x BAY and TAC seedlings, no significant difference in the time from sowing to leaf-splitting was observed.

Results indicate that hybrid vigor is evident in the four crosses studied.

Seedlings of hybrid crosses, namely: OD x BAY, CCN x BAY and LKY x BAY all exhibited hybrid vigor in terms of speed of germination, girth size, height, and length of time from shoot emergence to leaf splitting. In addition, leaf production rate was faster in OD x BAY and CCN x BAY seedlings than their respective female parents. TAC x BAY seedlings were taller and have bigger girth than TAC seedlings.

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