
STRATEGIES FOR THE COCONUT REPLANTING PROGRAM IN INDONESIA

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1. Introduction

For Indonesians, the coconut palm is a part of their lives because of its great contribution to the national economy, social, and culture needs. In addition, more than 98% of the total coconut area of 3,863,162 hectare belong to smallholders. The total production was 3,085,772 MT copra- equivalent in 2008, and more than seven million coconut farmer families are involved in this sector.

Low productivity is one of the main problems in the coconut industry. The average copra production at the farmer level is 1 ton/ha/year, whereas production potential of high yielding variety can reach up to 3.0-3.5 tons/ha/year of copra. Coconut replanting programme by using hybrid variety during 1970-1990 was not successful. Based on that experience, today more preference goes to seedlings of tall coconut variety than hybrid seedlings. About 15% of total coconut area of old and senile palms have to be replanted. Coconut replanting programme has been planned by the government of Indonesia via the Directorate General of Estate Crops for the period of 20 years (2005-2025). But after first five years (2005-2009), the realization was lower than the expected target. Non availability of funds and costly transportation of the seednuts were the main factors affecting the programme.

Therefore, the strategy for the acceleration of coconut replanting programme has to be changed based on the criteria of how coconut farmers/stakeholders can get the

good coconut variety which is easy to find, and close to replanting areas. The good quality planting materials will be obtained from a variety released from the identified High Yielding Block (HYB) and selected Coconut Mother Palms (CMP). The second strategy is to reiterate the commitments of the local government, private sector, processors and coconut industries on coconut replanting programme. If these strategies work well, the development for a sustainable and competitive coconut industry will be achieved.

2. Coconut Breeding Development in Indonesia

In the early 1970's, coconut production declined, while the demand for cooking oil was increasing. To overcome this problem, the government implemented various programs to increase the production of copra through coconut replanting program and the development of new area with coconut hybrids. To meet the large quantity of hybrid seednuts in a short period of time, the government introduced PB121 hybrid from Cote d'Ivoire. In addition, hybrid coconut seed gardens were established in 11 provinces with an area of 1856 hectares. Besides imported hybrids, the Indonesian government through the Agency for Agricultural Research and Development developed a local coconut hybrid. The type of hybrid coconut cross generated by this program was the Nias Yellow Dwarf x West Africa Tall.

To produce superior coconut seedlings to accelerate the

coconut rejuvenation program, the breeding programs in Indonesia in the past (1970-1990) was to produce planting material in a large scale with the high copra yield and early bearing characteristics (Liyanage, 1974). In accordance with this purpose, the chosen breeding method was the selection and hybridization of various types of hybrid coconut from dwarf x tall varieties.

2.1. Hybrid Coconut Period (1970-1990)

Crossing of dwarf x tall varieties was conducted since 1975. The local hybrid coconut with high input produced about 4-5 tons copra / ha / year (Novarianto, et.al., 1992). Three types of hybrid coconut namely KHINA 1 (Nias Yellow Dwarf x Tenga Tall), KHINA 2 (Nias Yellow Dwarf x Bali Tall) and KHINA 3 (Nias Yellow Dwarf x Palu Tall), have been released by the Ministry of Agriculture in 1984.

KHINA hybrid starts first flowering at the age of 3-4 years, produces copra at an average of about 4 tons / ha / year, and the highest production was 5 tons / ha / year. Oil content in the copra is 64%-65%. Content of copra is around 300 g / nut, or 3-4 nuts will produce 1 kg of copra.

Generally, the coconut farmers do not apply fertilizers for their coconut plantations. As a result, hybrid coconuts have small fruit size and experience low production. In addition to low production, the imported hybrid coconut, namely PB121 is susceptible to bud rot disease caused by *Phytophthora palmivora*, and less tolerant to drought conditions. In terms of

production and resistance to pest and diseases, KHINA hybrids are much better than the PB121 hybrid. Therefore, coconut farmers do not like coconut hybrids and do not want to replant their senile palms with hybrid coconut.

A survey conducted in the coconut plantation in North Sulawesi showed that 98% of coconut farmers had chosen tall coconut variety for replanting. It was reported that 94.44% of coconut farmers in Indonesia preferred high yielding local tall and local hybrid for use in development program. The farmers' preference for tall coconut is reflected in the area under tall coconuts which accounts for 93% of the total coconut area in Indonesia.

Farmers prefer tall coconut variety because: (1) Tall coconut does not require intensive maintenance, (2) It is more tolerant to drought conditions and resistant to bud rot disease, (3) Tall coconut seednuts seedlings are cheaper, and (4) There is no traumatic experiences with tall coconut varieties unlike in coconut hybrids.

2.2. Tall Coconut Period (1990-2008)

Considering the preference of coconut farmers, the coconut breeding program from the year 1990 - 2000 was concerted to produce tall coconut varieties with high copra yield. Mass selection based on the weight of the nut in tall coconut increases the nut yield. Selection of the best 5% mother palm provides 14.4% increase in the yield. However the selection of 10% and 15% increase only 10.1% and 7.9% respectively. Selected Mapanget tall variety produced 45 kg -50 kg copra/palm/year, which is a better yield when compared to the yield of Tenga tall, Bali tall and Palu tall.

During the period of 2000-2008, ICOPRI released 10 high yielding tall coconut varieties. The Ministry of Agriculture released Coconut Mapanget tall, Tenga tall, Bali tall and Palu tall in 2004, and coconut Sawarna tall in 2006. The copra yields of these five varieties are ranging from 2.2-3.5 ton / ha / year, which is higher than the average national production, i.e., 1.0-1.5 ton / ha / year. Other five coconut varieties were released in the year 2008. These superior coconut varieties have been recommended to be used as planting materials for the coconut replanting programme.

2.3. Program of Coconut Composite Variety

Composite varieties are produced in the natural crosses of several coconut varieties of high yielding. Santos *et. al.*, (2000) reported that coconut Tall x Tall Hybrid showed a better performance than the parent plants (heterosis effect), mainly the characters of time of flowering, number of nuts and copra yield. Nut components of the hybrid also showed the heterosis effect. Heterosis effects on weight of copra in Tenga tall x Bali tall hybrid and its reciprocal at the age of 7 years reached to 8.6 and it's an increase of 37.1%. It was reported that the heterosis effect of tall x tall hybrid coconut at the age of 10 years in the coconut composite varieties developed by Philippine Coconut Authority-Zamboanga Research Center (PCA-ZRC) ranged from 4.5% to 29.6% on the weight of nut and 1, 74% to 17.3% on the weight of copra. Copra weight in a nut of coconut composite varieties is 5-8% higher when compared with the yield of its parents.

Coconut composites have several advantages when compared with dwarf x tall hybrid. In addition to the high yielding properties (at

least 2.25 ton copra / ha / year), composite varieties are more tolerant to climatic variations. Coconut composite population with the highest heterosis effect is obtained through the selection of old coconut varieties which are having genetic dissimilarity distances and high production potential. The selection of coconut palms as materials for synthesizing Coconut Composite Variety has been done through analysis of molecular-markers.

Since 2003, Coconut Composite Seed Gardens have been established in some Provinces. Several varieties of coconut tall and hybrid are used to synthesize coconut composite varieties by open pollination. Until the year 2007, Composite Seed Gardens established in some provinces covered only 114 hectares, with the estimated production of 1 million seedlings. It was expected that each province / district established the composite seed gardens, in a minimum of 100 hectares to meet the demand for seedlings for replanting of coconut.

3. A Review of the Replanting and New Planting of Coconut

3.1. Coconut Replanting and Planting Program (2006-2010)

The Coconut Development Program initiated by the Directorate General for Estate Crops in 2004 aimed at increasing coconut production. The use of good quality seedlings in the rehabilitation and rejuvenation of coconut plantations was the policy adopted to increase coconut production, particularly in the old and senile coconut palms. As per the national agribusiness planned activities, during the 5-year period (2006 - 2010), it had to cover 100,000 hectares in rejuvenation and 10,000 hectares

in development, or a total of 550,000 hectares. One hectare required 220 seedlings for rejuvenation and/or development activities, within a year it requires 24,200,000, seedlings. To cater to this seedlings requirement needs 3,000 hectares of seed gardens. Sufficient seed gardens were not available to supply the above quantity of seedlings.

National proportion of old/senile palms (more than 60 years of age) is 15% out of the total coconut area covering 3.89 million hectares or 583,500 hectares. The continued implementation of the replanting program until the young plants grown up, fill up the damage caused by pests and diseases, and natural disasters are therefore important to maintain sustainable coconut production. The country's coconut replanting/planting programme is explained in Table 1.

3.2. Progress of Coconut Replanting (2007-2009)

The progress of the programme of the Directorate General of Estate Crops was very slow and

No.	CY in	Location of coconut replanting		Total (Ha)
		Provinces	Regents	
1.	2007	7	-	3,360
2.	2008	17	26	6,246
3.	2009	23	64	16,145
4.	TOTAL	-	-	25,751
5.	Planning in 2010-2014	-	-	187,983

it was far below the target due to limited funding support, poor maintenance after planting, lack of fertilizer application, seedlings, and control of pests and diseases and also dependence on the national and provincial/regional government. Now, the private sector is not ready to invest in the coconut sector or to establish coconut seed gardens to support this program. Therefore the progress during 2006 – 2009 was very low (Table 2).

The Indonesian Department of Agriculture has allocated a budget of Rp.800 billion or about US\$ 860 million for the Integrated Coconut Development Programme, including coconut replanting in 2007-2010. The Director General of Estate Crops predicted that the government

won't be able to replant all of the old/senile coconut palms in 33 Provinces of Indonesia as requested, where there are about 15% from the total areas or about 580,000 hectares. The progress of coconut replanting in Indonesia in the last three years (2007-2009) is given in Table 2. In 2007, total of 3,360 hectares have been replanted in seven Provinces namely North Sulawesi, Central Sulawesi, West Sulawesi, South Sulawesi, East Java, Banten and Riau. In 2008, total of 6,246 hectares have been replanted in 17 Provinces/26 Regents and in 2009, 16,145 hectares have been replanted in 23 Provinces and 64 Regents. Total replanted area was 25,751 hectares. This progress of replanting is lower than in the planning programme (Table 1). The target for coconut replanting in 2010-2014 is 187,983, or about 37,600 hectares each year.

No.	Activities	Year	Area (ha)	Needed coconut seednuts
1.	Rejuvenation	2006	100.000	20.000.000
		2007	100.000	20.000.000
		2008	100.000	20.000.000
		2009	100.000	20.000.000
		2010	100.000	20.000.000
	Total		500.000	100.000.000
2.	Development	2006	10.000	2.000.000
		2007	10.000	2.000.000
		2008	10.000	2.000.000
		2009	10.000	2.000.000
		2010	10.000	2.000.000
			Total	
	Total Amount (1+2)		550.000	110.000.000

4. Coconut Mass Production for Distribution to Farmers

4.1. Coconut Seed Garden

The ICOPRI in Manado, North Sulawesi produces about 200,000 seednuts/year mainly from Mapanget tall variety. Table 3 shows the demand and distribution of coconut seednuts from ICOPRI in 2006-2009 to 33 Provinces in Indonesia. The distribution of seednuts during the four year period (2006-2009) was fluctuating from year to year, whereas the lowest was in 2009 (13,600 seed nuts), and the highest was in 2008 (172,700

Table 3. Progress of Coconut Seednuts Distribution in Indonesia in CY 2005-2009 from ICOPRI Seed Gardens

No.	Province	Coconut Seednuts Distribution in CY					Total (seednuts) in 2005-2009
		2005	2006	2007	2008	2009	
1.	Nanggroe Aceh D.	-	-	-	-	-	0
2.	North Sumatera	-	-	-	-	-	0
3.	West Sumatera	-	-	-	-	-	0
4.	Riau	-	-	-	-	-	0
5.	Riau Islands	-	-	-	-	-	0
6.	Jambi	-	-	-	-	-	0
7.	South Sumatera	-	-	-	-	-	0
8.	Bangka Belitung	-	-	-	-	-	0
9.	Bengkulu	-	-	-	-	-	0
10.	Lampung	1,000	-	-	-	-	1,000
11.	DKI Jakarta	-	-	-	-	-	0
12.	West Java	-	1,400	-	-	-	1,400
13.	Banten	-	-	4,000	2,000	-	6,000
14.	Central Java	-	600	-	1,200	-	1,800
15.	D.I.Yogyakarta	-	750	1,000	-	-	1,750
16.	East Java	2,000	-	-	-	-	2,000
17.	Bali	-	-	-	-	-	0
18.	West Nusa Tenggara	-	-	-	-	-	0
19.	East Nusa Tenggara	-	-	-	-	-	0
20.	West Kalimantan	1,000	-	-	-	-	1,000
21.	Central Kalimantan	1,000	-	-	-	-	1,000
22.	South Kalimantan	-	-	-	-	-	0
23.	East Kalimantan	-	-	-	-	-	0
24.	North Sulawesi	8,000	-	-	43,500	5,800	57,300
25.	Gorontalo	2,000	8,000	36,700	-	1,200	47,900
26.	Central Sulawesi	-	-	-	18,000	-	18,000
27.	South Sulawesi	2,000	500	-	22,000	-	24,500
28.	West Sulawesi	-	-	-	-	-	0
29.	Southeast Sulawesi	-	-	-	-	-	0
30.	Maluku	-	-	-	-	-	0
31.	North Maluku	-	24,000	-	10,000	-	34,000
32.	Papua	-	20,000	40,000	76,000	3,000	139,000
33.	West Papua	-	-	-	-	3,600	3,600
	TOTAL	17,000	55,250	81,700	172,700	13,600	340,250

seednuts). The total seednuts distributed from the ICOPRI during 2005-2009 was 340,250, or about 85,062 seednuts per year. It was much below the capability of the seed garden. The two factors such as funding by the central and local government for replanting programme, and the geographic distance of the provinces from ICOPRI affected the replanting progress.

Indonesia consists of more than 17,000 islands stretching from Sumatera to Papua, and 33 coconut growing Provinces. Only 15 Provinces collected seednuts for replanting programme from

the ICOPRI. Out of that only 4 Provinces, namely Papua Province (139,000 seed nuts), North Sulawesi Province (57,300 seed nuts), Gorontalo Province (47,900 seednuts), and North Maluku Province (34,000 seed nuts) obtained more number of seednuts than did other provinces that requested less than 20,000 seed nuts. This is because these Provinces are located close to ICOPRI in North Sulawesi. The more distance, the more expensive will be the transportation cost of the seednuts which were usually transported either by truck within Sulawesi island or by boat to

North Maluku, and Papua from Manado, North Sulawesi.

In the future, the strategy and the technology have to be changed to accelerate the coconut replanting programme. The Provincial Governments and Regents, the private sector, or the coconut processing sector, such as: the Coconut Oil Mills, Desiccated Coconut Plants, etc., should collaboratively act to raise the fund for this coconut replanting programme. Because, more than 98% of the coconut raw materials are coming from poor coconut farmers holding less than 2.0 hectares.

Good seedlings guarantee the success of cultivation. Therefore, the establishment of a minimum of 100 hectares coconut seed garden in each Province has been noted in the Planning Strategy, but after the evaluation of the seed garden programme in 2006-2009, it was found that the progress was not running as expected. The establishment of coconut composite seed garden was only 81 hectares in 10 Provinces. On the contrary, the seed garden of other estate crops, such as the palm oil was very successful.

The strategy of preparing plant materials by establishing the seed gardens to support the fast growing palm oil areas was very effective in Indonesia. The total area of palm oil from 2005 to 2009 is around 5.0 million hectares to 7.44 million hectares, or an increase of 0.5 to 0.7 millions ha per year. Palm oil develops very fast, due to more profits compared to coconut palms. Another factor is that the plantlets of palm oil are small, so they are easy to handle and deliver from one island to another island either by boat or plane, for example, from Sumatera island to Kalimantan or Papua island.

The transport in the same island can be done by truck, for example along Sumatera island. As the transportation cost of coconut seednuts is very high, the strategy of preparing coconut seedlings must be different, and should match with smallholders. The technology to prepare quality coconut plant materials must be changed. The coconut farmers must get easy access to the cheaper seednuts /seedlings, which are close to replanting areas. The suitable technology is by using the High Yielding Block and select the individual palms with good performance and nut production. Actually, the ICOPRI has identified that every Province or Regent has a high yielding variety of their local talls.

4.2. High Yielding Block and Coconut Mother Palm

The coconut area is distributed in 33 Provinces of Indonesia. In 2008, the total coconut area was 3,863,162 hectares and produced about 3,085,772 MT copra equivalent (Table 4). The main coconut Provinces with more than 200,000 hectares are Riau Province (628,582 hectares), East Java Province (288,120 hectares), North Sulawesi Province (268,973 hectares), Central Java Province (234,651 hectares) and North Maluku Province (210,107 hectares).

Identification of High Yielding Block (HYB) and Coconut Mother Palm (CMP) in each Province and Regent is aimed at finding one of the sources for the coconut seedlings programme. Some of the HYB criteria include: easy-to-reach location, the palm ages 15-60 years, they should have uniform morphology, average production is >70 nuts/palm/year, they are free from pests and diseases. The CMP is individually selected from the HYB population, and maximum selection is 15%.

Some of the CMP criteria, are, for example: Spherical or Semi-spherical crown, the number of

2005-2009 are shown in the Table 4. The HYB has been identified in 15 Provinces. A

Table 4. Coconut Area and Production in 2008, Selected High Yielding Block in 2005-2009 and Estimation Seednuts Production of 33 Provinces in Indonesia

No.	Province	Coconut area and Production in 2008 ¹⁾		Selected High Yielding Block (HYB) during 2005-2009		Can be using for replanting (ha)
		Total area (ha)	Copra Production (Ton)	Total HYB (Ha)	Estimation seednuts/year	
1.	Nanggroe Aceh D.	112,430	72,188	-	-	?
2.	North Sumatera	123,831	110,079	30	22,500	112.5
3.	West Sumatera	90,296	80,259	-	-	?
4.	Riau	628,582	460,916	-	-	?
5.	Riau Islands	40,623	11,176	-	-	?
6.	Jambi	117,224	117,928	236	177,000	885
7.	South Sumatera	60,850	72,666	-	-	?
8.	Bangka Belitung	10,317	3,963	-	-	?
9.	Bengkulu	8,702	7,333	-	-	?
10.	Lampung	153,593	121,865	10	7,500	37.5
11.	DKI Jakarta	0	0	-	-	?
12.	West Java	190,589	147,002	-	-	?
13.	Banten	82,670	30,501	-	-	?
14.	Central Java	234,651	178,575	60	45,000	225
15.	D.I.Yogyakarta	43,422	47,893	100	75,000	375
16.	East Java	288,120	221,473	1,100	825,000	4,125
17.	Bali	70,467	69,842	100	75,000	375
18.	West Nusa Tenggara	67,216	47,556	-	-	?
19.	East Nusa Tenggara	161,563	66,032	50	37,500	187.5
20.	West Kalimantan	111,778	75,504	-	-	?
21.	Central Kalimantan	88,394	81,945	12	9,000	45
22.	South Kalimantan	51,367	34,207	-	-	?
23.	East Kalimantan	42,305	42,205	-	-	?
24.	North Sulawesi	268,973	227,761	134	100,500	502.5
25.	Gorontalo	63,128	60,226	100	75,000	375
26.	Central Sulawesi	171,993	191,180	100	75,000	375
27.	South Sulawesi	114,964	92,203	120	78,250	391
28.	West Sulawesi	67,930	67,664	50	37,500	187.5
29.	Southeast Sulawesi	54,544	34,118	-	-	?
30.	Maluku	90,491	70,629	-	-	?
31.	North Maluku	210,107	222,778	10	7,500	37.5
32.	Papua	31,067	12,672	-	-	?
33.	West Papua	10,975	5,452	-	-	?
	TOTAL	3,863,162	3,085,772	2,212	1,647,250	8,236

green-leaf is >29 leaf, short, wide, and vigorous petiole, nut production is >7 nuts/bunch, etc. The next step is to select seednuts, and seedlings from the identified HYB and CMP.

Selecting 5% of the best CMP will increase the copra yield 14.4%, and while selecting 10% and 15% will increase successively 10.1%, and 7.9%. The results of identification of HYB in several Provinces during

total of about 2,212 hectares HYB have been identified until 2009. Good CMPs have been selected in each HYB, and maximum selection was 15%. From these overall HYBs can produce 1,647,250 seednuts for replanting 8,236 hectares every year. The capacity of HYB is lower than the requirement to meet the replanting of 100,000 hectares per year as set out in the macro programme.

In the future, the programme of identification HYB and selection the CMP in each Province must achieve the target of the replanting programme. The largest HYB is in East Java Province with a total of 1,100 hectares (Table 4). The detail of CMPs and coconut farmers of East Java Province is presented in Table 5.

Table 5 shows the location of HYB, for example in Sumenep Regent, Gapura District (Andulang Village), Panggul District (Wonocolo Village) and Tugu District (Prambon Village). The total of 264 CMPs belongs to 32 coconut farmers. The total of 4,495 palms have been selected as CMPs in East Java during 2005 to 2009. These HYBs and CMPs are used as the source of seednuts to support the replanting programme in East Java.

The other advantage for selecting CMPs from the local tall is that it has adapted to the environment, and tolerant to pests and diseases compared with CMPs introduced

from the outside.

5. Strategy to Accelerate Coconut Replanting

5.1. Released Coconut Variety

To conform to the Code of Conduct of Law No.12, 1992 and Government Rule No.44, 1995 seednuts/ seedlings of superior variety could only be distributed for planting after being released by the Minister of Agriculture. Any plant variety that will be released by the Minister must be the results of observations and the adaptive experiments in multi locations, and genetic evaluation by an expert team appointed by the Minister. The released variety must be certified by the government and its distribution to the farmers/ stakeholders must be cleared by a letter from Minister of Agriculture.

From 1984-2009 ICOPRI has released 25 coconut varieties, consisting of 12 tall varieties, namely Mapanget tall and Bali tall; 4 dwarf types, for example: Salak dwarf and Nias Yellow dwarf; and 9 coconut hybrids,

such as: KHINA-1 and KB-3. But the availability of seed nuts/seedlings of these coconut varieties is very limited for distribution among the coconut farmers for replanting. The establishment of coconut seed garden in the Provinces/Regents is very slow. The ICOPRI seed materials are costly, and the availability of seednuts is also limited in the ICOPRI. The ICOPRI mandate is to produce superior variety and prepare the breeder seed but it is not involved in multiplication of seednuts for replanting programme.

The ICOPRI has collaborated with Estate Crops Institute of Provinces/Regents to observe the morphological characteristics and potential yield of the local tall in HYB in three years period, and then to submit the results for evaluation by the Expert Team. During 2006 to 2009, four tall varieties, such as: Sikka tall from Flores Island, East Nusa Tenggara Province; Bojong Bulat tall from D.I. Yogyakarta; Molowahu tall and Kramat tall from Gorontalo Province have been released (Table 6). The yield potential of these four varieties is 2.5 ton – 3.4 ton copra/ha/year.

5.2. The Role of Local Government and Private Sector to Accelerate the Coconut Replanting

Central Sulawesi Province is one of the coconut provinces in Indonesia that has planned “the Revitalization of Coconut Programme” in three years (2010-2012) with a budget allocation of 10 billion rupiah (US\$ 1.075 million) for Integrated Coconut Development. The Estate Crops Institute will prepare one million coconut seedlings. Another coconut replanting programme is also implemented in North Sulawesi Province by

Table 5. Location of HYB, the Number of CMP and Coconut Farmers as the Owner in East Java Province

No.	Regent	District	Village	Number of CMP	Number of coconut farmers as owner	Identification and selection in CY
1.	Sumenep Trenggalek	-Gapura -Panggul -Tugu	-Andulang -Wonocolo -Prambon	264	32	2005
2.	Banyuwangi	-Klabat -Kalipuro	-Sukojati -Suko -Gembengsari -Telemung	623 1,007	64 68	2005 2007
3.	Tulungagung	-Bandung -Kalidawir	-Sebalor -Sukorejo, -Joho	675	118	2007
4.	Blitar	-Srengat -Wonodadi	-Kerjen -Wonorejo -Kandangan -Kolomayan -Pikatan	920	197	2009
5.	Pacitan	-Ngadirojo	-Hadiwarno -Sidomulyo	1,006	324	2009
TOTAL				4,495	803	

Table 6. Description of High Yielding Four Varieties from On-farm Population

No.	Origin and their characters	Description of high yielding local tall varieties			
		Sikka tall	Bojong Bulat tall	Molowahu tall	Kramat tall
1.	Origin	Bloro villages, Maumere District, Sikka Regent, East Nusa Tenggara Province	Bojong village, Panjatan District, Kulon Progo Regent, D.I.Yogyakarta	Molowahu village, Tibawa District, Gorontalo Regent, Gorontalo Province	Kramat village, Sailama District, Boalemo Regent, Gorontalo Province
2.	Date of flowering (months)	48-60	48-60	48-60	48-60
3.	Date of harvesting (months)	60-72	60-72	60-72	60-72
4.	Number of bunches/year	12-14	12	14	13
5.	Number of fruits/bunch	6-9	8	9	8
6.	Number of fruits/palm/year	72-108	88-107	100-126	100-104
7.	Number of fruits/ha/year	10,000-15,000	8,800	14,300	14,300
8.	Number of nuts/kg copra	4	4-5	4-5	4-5
9.	Copra yield/palm/year (kg)	18-25	21.3	25	20.8
10.	Copra yield/ha/year (Ton)	2.5	2.5	3.3-3.4	2.5-3.1
11.	Oil content of copra (%)	64	68-69	67	65
12.	CY of released	2006	2008	2009	2009

providing a subsidy for fertilization, and the control of the bud rot disease.

PT. Unilever Indonesia Tbk. via Indonesian Unilever Foundation has contributed 12,400 seedlings of local tall coconut to coconut farmers in Pangandaran, Ciamis Regency, West Java Province. The Programme covered 138 coconut areas, and involved 1,240 coconut farmers who produced coconut sugar. Each coconut farmer received 10 coconut seedlings. The Unilever has partnership with "Coconut Sugar Association", an

organization of coconut farmers of sugar tapping, coconut sugar merchant in Garut, Tasikmalaya and Ciamis Regencies, West Java Province. The coconut sugar production in Ciamis Regency is 184 tons/day from tall coconuts, and 15,13 tons/day from hybrid coconut. This hybrid coconut sugar is used by the Unilever to produce "Kecap Bango" (Bango ketchup). This partnership is a part of Corporate Social Responsibility Programme by Unilever for developing Small and Medium Enterprises. This Coconut Replanting Programme has been



High Yielding Coconut Varieties

done to support the Planting, Distributing, and Nurturing Movements for Food Security (in Bahasa "Gerakan Tanam, Tebar dan Pelihara untuk Ketahanan Pangan") pioneered by Mrs. Ani Yudhoyono, the First Lady of Indonesia. If this model of coconut replanting programme can be followed by the other coconut industry sectors, such as: coconut oil, desiccated coconut, coconut milk, nata de coco, coconut wood, etc., the coconut replanting program can achieve a higher target in the future.

6. Conclusion

The old/senile coconut palms are more than 15% or about 580,000 hectares. The target of the Coconut Replanting Program is 100,000 hectares per year. However, the realization of coconut replanting from 2007 to 2009 is 25,751 hectares in 23 Provinces/ 64 Regents. The ICOPRI released 25 coconut varieties during the period of 1984 to 2009, but the released varieties are not well adopted by coconut farmers. The breeder seed of ICOPRI can produce 200,000 seednuts per year, but the average distribution is only 85,062 seednuts per year during 2005 to 2009. The main hindering factors are limited funding support, availability of planting materials, and high transportation cost of the seednuts. The Identification of High Yielding Block and then followed by selecting Coconut Mother Palm in each Province/Regent/District is the better strategy and technology to accelerate coconut replanting. The result of High Yielding Block identification from 2005 to 2009 is about 2,212 hectares, which can supply 1,647,250 selected seed nuts. During 2006 to 2009, the ICOPRI helped to evaluate several local tall of on-farm, and was successful to release four local tall varieties. Local government of Provinces and Regencies, and private sectors, processors must be more concerned and should support and provide funding for seedlings to accelerate the Coconut Replanting Programme.

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