

Huay Bong 60: New developed Thai cassava (*Manihot esculenta* Crantz) variety with improved starch yield and quality

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Abstract

Huay Bong 60 is new developed Thai cassava variety under the collaboration between Kasetsart University and the Thai Tapioca Development Institute. It was developed since 1991 by conventional breeding between Rayong 5, the latest developed variety by Rayong Field Crops Research Center and Kasetsart 50, the latest developed variety by Kasetsart University. After seedling selection, single row selection, preliminary yield trial and standard yield trial, it was selected for further evaluation in regional yield trial for at least 10 locations and had the average yield of 35.94 ton/ha with the average starch content of 25.4%. The average yield and starch content of Huay Bong 60 was slightly higher than those of Kasetsart 50, the most widely grown variety in Thailand. Extracted starch was white with high paste viscosity. This new developed variety also has good plant type, good stake with good rate of germination and can be another good variety for cassava industry.



Huay Bong 60, an official name of new developed cassava variety given by Her Royal Highness Princess Maha Chaki Sirindhorn on August 8, 2003.

Introduction

Cassava breeding program is one of the most significant research missions that can, in part, strengthen Thai cassava industry. By the immense effort of many organizations including the Rayong Field Crops Research Center (RFCRC), Dept. of Agriculture, Ministry of Agriculture and Cooperatives (MOAC), Kasetsart University and the Thai Tapioca Development Institute (TTDI), new improved cassava varieties have been continuously developed since 1957 when Rayong 1 was selected as the best clone from local cultivar collection by RFCRC (Rodjanaridpiched et al., 1993). Subsequently, many recommended varieties with high root yields including Rayong 60, Rayong 90, Kasetsart 50, and Rayong 5 were successfully introduced by RFCRC and Kasetsart University under the promotion of MOAC and the TTDI (Rodjanaridpiched et al., 1993). Currently, Kasetsart 50 (KU50) and Rayong 5 (R5) are the most commonly grown varieties by farmers because of their high fresh root yields and root starch contents. The breeding was then proceeded by the cross between R5 and KU50 in 1991/1992 by Kasetsart University under the support of TTDI. After seedling selection, single row trial, preliminary yield trial and standard yield trial, a total of 10 clones was selected for further evaluation in regional yield trial. One of them was MKUC 34-114-206, which was later officially released as Huay Bong 60, named after the agricultural station of TTDI by Her Royal Highness Princess Maha Chaki Sirindhorn. In this paper, the qualities of Huay Bong 60 of which not only the root yields were considered, but also the root and starch quality including contents of starch, water soluble non-starch and toxic cyanogenic compounds and starch paste properties were reported.



(a)



(b)



(c)

Characteristics of (a) plants (b) leaves and (c) roots of new developed Thai cassava variety, Huay Bong 60

Materials and methods

Plantation

A Regional Yield Trial of Huay Bong 60 was conducted during 1998 to 2001 at 10 locations in most crowded cassava planting provinces including Nakornratchasima, Chaiyaphum, KhonKaen, Choburi, Chachaengsao, Prajeanburi, SraKaew, Chantaburi, Rayong and Kanjanaburi with three check varieties including Rayong 5, Kasetsart 50 and Rayong 72, the latest developed variety in Thailand. Root harvest was performed manually at 10.5 months old. The yield of fresh and dried roots was recorded. Starch was extracted from roots within 24 hrs after harvesting.

Root and starch quality analysis:

- Starch content in fresh roots by a Rieman balance (Bainbridge et al., 1996) and by a polarimetric method (AOAC, 1995)
- Content of water soluble non-starch carbohydrate of fresh roots (Gaosong et al., 1997) using the phenol-sulfuric method (Dubois, 1956)
- Cyanide content in fresh roots by an enzymatic method (O'Brien et al., 1994)
- Paste viscosity of extracted starch by a Rapid Visco Analyzer (RVA 4, Newport Scientific, Australia; Sriroth et al., 1998)

Table 3 Paste viscosity as determined by a Rapid Visco Analyzer of starch extracted from different cassava varieties from a regional yield trial at 10 locations and harvested at 10.5 months after planting.

Variety	Pasting temperature (°C)	Peak viscosity (RVU)	Trough viscosity (RVU)	Final viscosity (RVU)	Breakdown* (RVU)	Setback from trough** (RVU)
Huay Bong 60	70	424	154	238	262	84
Rayong 5	69	406	144	227	256	82
Rayong 72	70	377	135	219	236	84
Kasetsart 50	71	404	151	232	249	81

*Breakdown = Peak viscosity – Trough viscosity

**Setback from trough = Final viscosity – Trough viscosity

Results

Table 1 Yield of fresh and dried cassava roots of different varieties from a regional yield trial at 10 locations and harvested at 10.5 months after planting.

Variety	Yield of fresh root		Yield of dried root	
	ton/ha	%*	ton/ha	%*
Huay Bong 60	36.25	107	13.13	107
Rayong 5	31.25	93	11.88	94
Rayong 72	37.5	111	13.13	106
Kasetsart 50	33.75	100	12.50	100

*relatively to Kasetsart 50

Conclusion

This new improved variety, i.e. Huay Bong 60 obtained from the conventional breeding of Kasetsart 50 and Rayong 5 would serve as an alternative variety for cassava growers, a promising crop for mankind staple food and good economic-return materials for various industries.

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Table 2 Important components (starch as determined by Rieman balance and Polarimetric method, water soluble non-starch carbohydrate and cyanogenic compounds) in cassava roots of different varieties from a regional yield trial at 10 locations and harvested at 10.5 months after planting.

Variety	Starch content as determined by (% wet basis)		Water soluble non-starch carbohydrate content (g/100 dried roots)	Cyanogenic content (mg HCN equivalent / kg dried roots)
	Rieman balance	Polarimetric method		
Huay Bong 60	25.4	29.86	5.01	66
Rayong 5	24.1	29.77	5.03	40
Rayong 72	23.5	28.75	6.41	97
Kasetsart 50	25.0	29.57	5.42	88