

SELECTION AND DEVELOPMENT OF CASSAVA CULTIVAR KM140

Cassava (*Manihot esculenta* Crantz) is a staple food crop for more than 500 million peoples around the world. The crop is also served as raw materials for livestock, candy, alcohol, noodle, seasoning industry. Cassava originated in South America and expanded wildly to Asia, Africa and being cultivated in 100 countries in a range from 39°N to 30°S. World total area cultivated to cassava in 2005 was 18.69 million hectares with average fresh root yield of 10.87 tons per hectare, total production of 203.34 million tons, export commodities of 6.9 million tons (including tapioca, dry slice and starch) mainly from Thailand, Vietnam and Indonesia (FAOSTAT 2006). Cassava is attracting attentions from many institutions, agencies (FAO, CIAT, IITA, Bill Gates Foundations, Rockefeller Foundations). Cassava cultivation is considered as a major food-safety strategy in many countries in Africa, where malnutrition has grown almost double over the last two decades. Cassava is also a source of raw materials for livestock industry with reasonable prices in many countries of America and Asia.

Cassava in Vietnam has been rapidly changed its role from food crop to industrial one in the beginning of 21st Century. In 2005, area planed to cassava was 390,000 hectares, with total production of 5.7 million tons of fresh root and average yield of 14.61 tons per hectare (FAOSTAT 2006). As compared to the year 1999, the production increased threefold; fresh root yield augmented twofold with increasing rate of 14.7% and area cultivated to cassava increased 11.7% annually. Vietnam has become second most important cassava exporters ranging after Thailand. Cassava starch has become as one of the top seven promising exporting commodities and is attracting attentions from many local government authorities. In Vietnam, there are 53 cassava processing factories with capacity about 3.8 million tons of fresh root annually; and there are above 2000 small farmer cassava processors (feed processing factories not included) produce 800,000-1,200,000 tons of starch annually, of which 70% for export and 30% used domestically.



Cassava variety KM98

In Asia, Vietnam has made the fastest progress in application of new technologies in breeding and new cultivar propagation (Kazuo Kawano 2001, CIAT Review 2005). Such progress has been considered as a result of many factors, of which the success in breeding and application of new technologies were the main contributing factors (Hoang Kim *et al.* 2006).



New cassava variety grown in South Eastern Region

The Ministry of Agriculture and Rural Development (MARD) has planned to remain cassava area around 380.000 to 400.000 hectares from 2006-2010 and efforts to increase fresh root yield from 14.61 ton/ha in 2005 to 20 ton/ha in 2010 and total production from 5.6 million tons in

2005 to 7.6 million tons in 2010 by using new technologies, especially in breeding.

To meet the demands raising cassava cultivation, we have carried out the study on the *Development of cassava cultivar with good yield and qualities for different ecological zones in South Vietnam*, in collaboration with Root Crop Center- Institute of Agricultural Science and Technology of Vietnam.

The objectives of this study were to breed and develop new cassava cultivars with growth duration from 7-10 months (1-2 months earlier as compared to cultivar KM94) with the same starch

yield. New cultivars must have good appearance in root tube, white flesh, less bitterness, straight plant, shot nodes, small plant diameter, resistant to pests and diseases.

Two experiments for determining the best harvesting time of some cassava cultivars were carried out. On red soil, experiments were planted at beginning of rainy season and harvested after planting from 6,7,8,9,10,11 and 12 months. On grey soil, planted at beginning rainy season and then harvested after 10, 11 and 12 months.

Cassava cultivar comparison (1998-2005)

Table 1: Cassava cultivar comparison results of KM 140 with others planted in farmer fields (South Vietnam, 1998-2005)

Cultivar	Harvest time (month)	Root yield (ton/ha)	Dry matter (%)	Starch content (%)	Starch yield (ton/ha)	HCN content in root (mg/kg)
KM140	7-9	33.4	40.2	27.0	9.5	105.9
KM98-5	7-9	35.5	40.1	27.5	9.8	163.7
KM98-1	7-9	31.2	38.8	26.6	8.3	178.0
KM146	7-9	38.0	35.2	18.7	7.1	146.7
KM112	7-9	29.4	40.2	27.7	8.1	183.7
KM94	9-11	28.1	40.3	27.4	7.6	219.0



Data of 30 cassava comparison experiments from 1998 to 2005 (Table 1) revealed that KM140 had fresh root yield of 33.4 ton/ha, starch yield 9.5 ton/ha; better than that of KM94. Content of HCN in KM140 is 105.9 mg/kg dry matter, it can be used as fresh consumption, lower than that of KM94; its harvest index was 65%, good resistance to pests and diseases. KM140 is now playing an important role in cassava production in South East and Central Coastal regions, Central Highlands and the mountainous areas in the North (Quang Binh, Nghe An, Thanh Hoa, Yen Bai, Lao Cai). KM 140 has been recognized by CIAT as one of the best cultivars in Asia (CIAT Review, 2005)

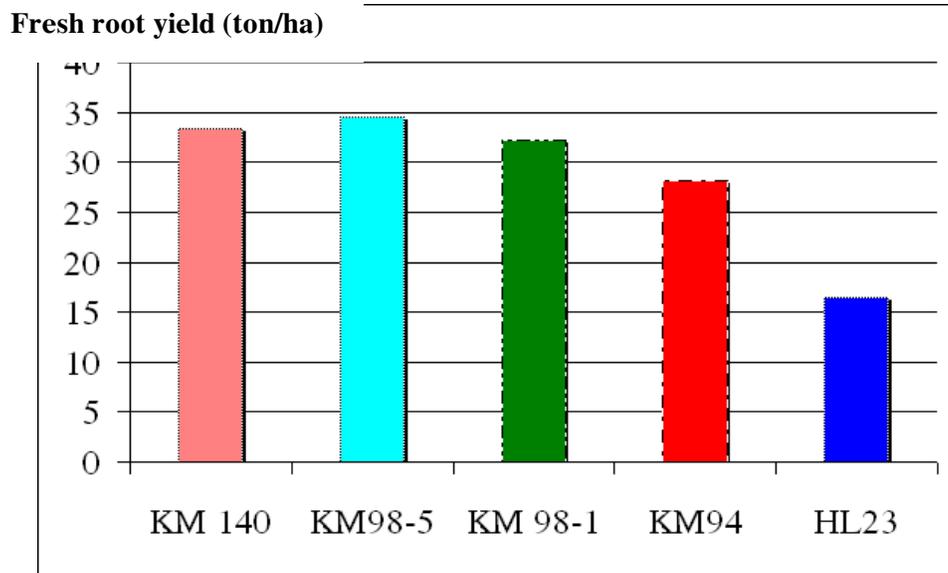


Figure 1: Fresh root yield of KM140 comparing to some popular cassava cultivars in production



KM140 seven months after planting

Determination of optimal harvesting time

Planting at middle of rainy season and harvesting 10 months later revealed that all cassava cultivars gave low starch content (16.6% - 22.5%). If

harvested 11 months after planting, almost cultivars had starch content around 25% satisfying the requirement of processors. If harvested 12 months after planting most of the cultivars gave good fresh root yield and starch content, but this would cause inconveniences for next crop cultivation. Considering above results and reasoning, it is recommended that the best harvesting time is 11 months after planting.

Planting at beginning rainy season and harvesting at 7, 8 and 9 months after, KM140 gave fresh root

yields of 23.5, 26.7 and 28.7 ton/ha, respectively, equal to that of KM94. Starch content of KM140 harvested 8 months after planting was 28.4%, higher than that of KM94 (26.2%), with significant difference.

Starch content (%)

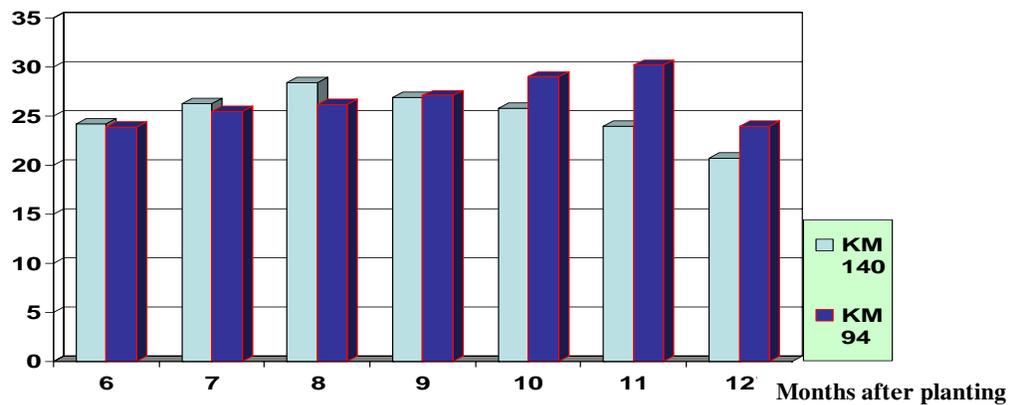


Figure 2: Starch content (%) of KM140 and KM94 (Hung Think & Trang Bom, Dong Nai)



Variety KM 98-5

After 7 years (1998-2005) of breeding and selection at Hung Loc Agricultural Research Center and testing-demonstrations over provinces, the prominent cultivar KM140 has appeared to satisfy the objectives of study:

- Best harvesting time must be between 7 to 9 months after planting.
- Fresh root yield of 33.4 ton/ha, starch content of 26.1-28.5%; Starch yield of 9.45 ton/ha.
- HCN content in KM140 root flesh is 105.9 mg/kg of dry matter.
- Erective and short inter-node plants, non-branching in South Eastern region, low branching in Western Highland Plateau and in the Northern provinces.
- Uniform root shape, white root flesh which are satisfying the market preference and processing requirements.
- Good resistance to pests and diseases.