

Cambodian Agricultural Research and
Development Institute (CARDI)

**RAS5070: Developing Bioenergy Crops to Optimize Marginal Land Productivity
through Mutation Breeding and Related Techniques (RCA)**

IAEA/RCA Coordination Meeting to Discuss the progress of
the field trials

**Work Plan for Gamma irradiation of cassava
for higher starch content and yield**

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Introduction to cassava production in Cambodia

In Cambodia, cassava is the second major cash crop after rice. According to MAFF (2013), Cambodia's total area under cassava production expanded dramatically from around 16,000 ha in 2000 to 573,624ha in 2015 accounting for 14.4% of the total cultivated area.

- Average yield of 34.00 t/ha and 26% of starch content.
- A number of factors are driving this increase cassava production:
 - + Rise of international price (fluctuated by year)
 - + New domestic processing facilities
 - + Adaption of higher yielding varieties

Agricultural Crops Production Areas in 2015 (MAFF, 2016)

Crop	Area (ha)	(%)
Rice	3,051,412	76.6
Cassava	573,624	14.4
Maize	112,574	2.8
Soybean	66,824	1.8
Mungbean	57,172	1.4
Vegetable	47,373	1.2
Sesame	26,514	0.7
Peanut	15,519	0.4
Sugar cane	19,514	0.5
Sweet potato	5,757	0.1
Tobacco	6,545	0.2
Jute	135	0.0
Total	3,892,805	100



Introduction to cassava production in Cambodia

The main cassava factories in Cambodia

	MRT Tapioca Factory	T.T.Y. Tapioca Factory	Lay Wine Factory	Cassava starch and food processing units
Location	Sihanouk Ville	Kampong Cham	Phnom Penh	Kampong Cham
Start operation	2000	2001	2001	Some time ago
Equipment and technology	Thai equipment	Thai equipment and technology	France yeast and technology	Manual or partially mechanized
Material (t/day)	250 t fresh roots	250 t fresh roots	55 t dry chips	Fresh roots
Price of materials	20 US\$/t fresh cassava roots	22-25 US\$/t fresh cassava roots	60-65 US\$/t dry chips	22-25 US\$/t fresh cassava roots
Starch content	24-25% in fresh roots	25-28% in fresh roots	64% in dry chips	25-28% in fresh roots
Production capacity	50 t starch per day	50 t starch per day	27,400 liters cassava alcohol (95°) per day	
Actual production in 2001	500 t starch	2000 t starch	1.6 million liters cassava alcohol	Tapioca pearls, noodles, cake, dessert etc.
Price of product	150-160 US\$/t starch	150-160 US\$/t starch	0.3 US\$/liter cassava alcohol	
Marketing	Local market and export	Local market and export	Local market	Local market

Cassava improvement traits

However, yields differ markedly across the country, due to cultivation can have serious diverse impacts on soil fertility, which sharp decreases in yield.

Therefore, cassava improvement should be reviewed as:

- Suitable **high-yielding** varieties for specific agro-ecological condition
- Enhancing **starch content**
- Suitable for using as food, animal feed or processing industry
- Resistance to pests and diseases



Material and method

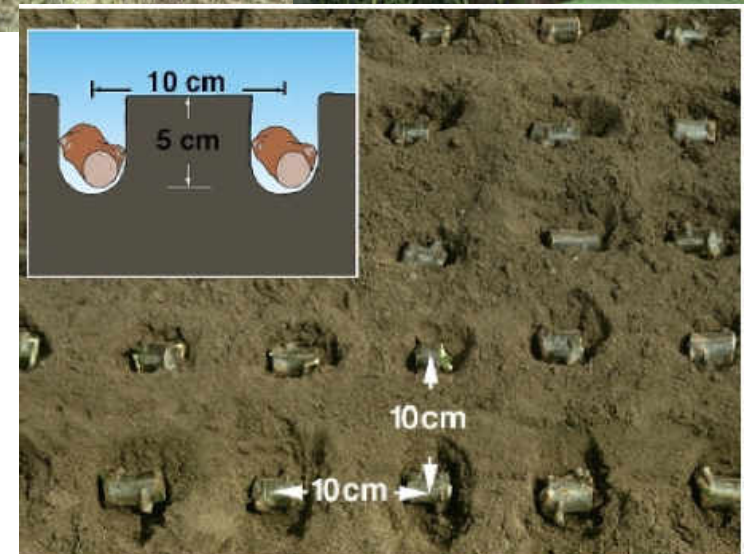
- Varieties: Damlong Kor (local) and KU50/KM94
- Irradiation method: gamma ray
- Plant material:
 - Cassava stake length: 20 cm
 - Number of stake: 20/variety
- Gamma dose: 10, 20, 30, 40 and 50 Gy
- Stake multiplication for Multi-location trial

Stake multiplication field



Irradiated cassava were advance to open field for M2 generation.

Planting Date: 01 Feb 2017



Next tasks

Crop	Target Traits	Activities	
		2017	2018
Cassava	Enrich starch content and yield potential	<ul style="list-style-type: none">• M2- generation• Screening on desirable traits namely starch content and yield potential	<ul style="list-style-type: none">• M2-M3 generation• Preliminary yield trial on marginal land• Measurement of starch content

* Screening of the cassava M2 generation will be carried out in Oct 2017 at CARDI.

Plant material and planting method

Plant material:

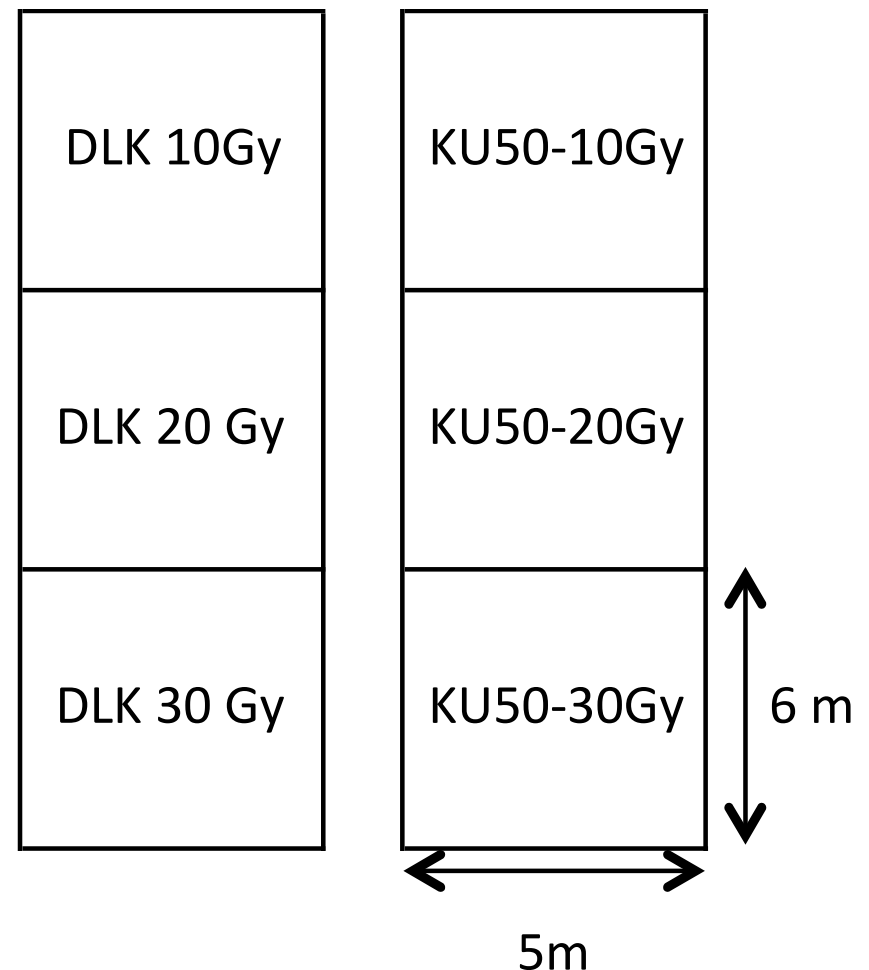
- Number of variety: 2 (Damlong Kor and KU 50/KM94
- Gamma does: 10, 20 and 30 Gy

Planting method:

- Plant spacing: 1m x 1m and 0.5m
- Planting depth: 5 cm
- Stake length: 15-20 cm
- Number of stake/hole: 1
- Number of stake/plot: 42
- Replacement: 1-2 weeks after planting

Data measurement and field layout

- Planting and harvesting date
- Missing plant at harvest
- Fresh root weight
- Root yield
- Starch yield on fresh root
- Pest and disease incidence
- other



Thank you for attention!