CASSAVA: FACTS AND FICTION

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Overview of Cassava production

Cassava *(Manihot esculenta Crantz)* is a perennial woody shrub, grown as an annual. Cassava is an increa singly important source of starch for various food and industrial uses. The annual value of cassava starch (or tapioca) traded globally exceeds any other form of native starch. Modified starches, sweeteners and syrups, and various fermentation products and acids derived from cassava grown in Asia are utilized throughout the world. Cassava is also a low-cost source of energy (carbohydrate) for animal feeding and is used as a feedstock in the production of bio-ethanol.

Cassava is currently the most important upland crop of Cambodia. Its production has increased rapidly due to the growing global demand for many final products derived from cassava with a positive long-term outlook. Much of the production increase has been due to land conversion from other upland crops (such as maize) that became less economically competitive; and through the expansion of the agricultural frontier. It is also used as an intercrop during the establishment years of various other tree-based systems such as rubber, pepper and cashews. The growing reliance on cassava cultivation has led to millions of Cambodian smallholder farmers depending on cassava production for their livelihoods.

Cassava myths and realities

Cassava production is surrounded by many misunderstandings. Some commonly repeated information about cassava production is based more in myth than in fact. To evaluate some of this misinformation, this factsheet explores the most common myths and realities about cassava cultivation.

Myth 1: cassava destroys soil fertility.

Reality: Over the years, continuous cropping and inappropriate farm management leads to net nutrient removal and gradual decline of soil fertility. Nevertheless, the same is true of all crops. Is cassava worse in this regard than other crops?

Table 1 demonstrates that cassava does not extract more nutrients per kilogram of harvested root relative to other comparable crops. However, one of cassava's major strengths as a crop is its ability to produce relatively high yields, even when grown on degraded soils.

Cassava's reputation to contribute to soil exhaustion is therefore more a result of its ability to produce high yields. **Said simply, cassava removes more nutrients than other crops because it has a higher yield, not because it is an inherently a 'bad' crop.**

Practices like incorporating harvest residues to the soil, intercropping, green manuring, the use of contour strips, and other management options can reduce nutrient depletion in cassava-based systems.

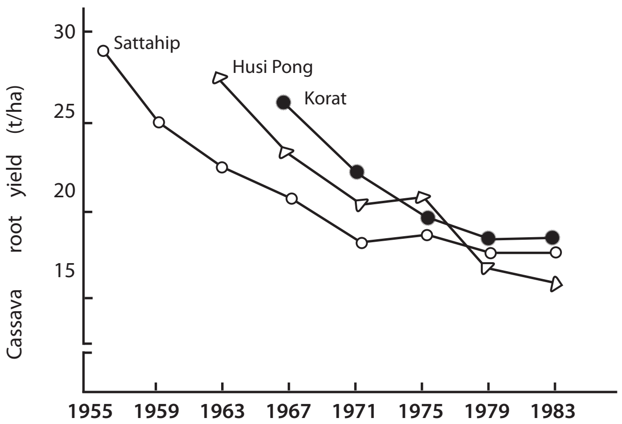
Table 1. Average nutrient removal (kg ha-1 and kg t- l harvested product) by Cassava and 10 other upland crops.

CROP/PLANT PART	YIELD (T HA^{-1})		(KG HA^{-1})			(KG T^{-1}) DM PRODUCED			REFERENCE
	Fresh	Dry	N	P	K	N	P	K	
Cassava / roots	35.7	13.53	55	13.2	112	4.5	0.83	6.6	1
Sweet potato / roots	25.2w	5.05	61	13.3	97	12.0	2.63	19.2	2
Maize / grain	6.5	5.56	96	17.4	26	17.3	3.13	4.7	3
Rice / grain	4.6	3.97	60	7.5	13	17.1	2.40	4.1	4
Wheat / grain	2.7	2.32	56	12.0	13	24.1	5.17	5.6	5
Sorghum / grain	3.6	3.10	134	29.0	29	43.3	9.40	9.4	5
Beans / grain	1.1	0.94	37	3.6	22	39.6	3.83	23.4	6
Soya / grain	1.0	0.86	60	15.3	67	69.8	17.8	77.9	7
Groundnut / pod	1.5	1.29	105	6.5	35	81.4	5.04	27.1	8
Sugarcane / cane	75.2	19.55	43	20.2	96	2.3	0.91	4.4	9
Tobacco / leaves	2.5	2.10	52	6.1	105	24.8	2.90	50.0	10

Adapted from Howeler, R. H. (1991). References for Table 1: 1, Nijholt (1935); Howeler and Cadavid (1983); Howeler (1985a). 2, Scott and Ogle (1952). 3, Mudra (1953); Barber and Olson (1968); Scott and Aldrich (1975). 4, Van Rossem (1917); Gerboua (1954); Scott and Aldrich (1975). 5, Scott and Aldrich (1975). 6, Cobra Netto (1967). 7, Jacob and Alten (1943). 8, Bouyer (1949). 9, Barnes (1953); Du Toit (1955); Innes (1959). 10, Schmid (1951).

Myth 2: cassava is a 'low maintenance' crop. It does not need fertilizers.

Reality: Like any crop, cassava achieves its best yields under proper management. With a lack of inputs to replenish the nutrients removed by harvest, yields will decline. Figure 1 demonstrates yield decline over an eight year period in Thailand. These trends are typical of other similar experiments in Southeast Asia.



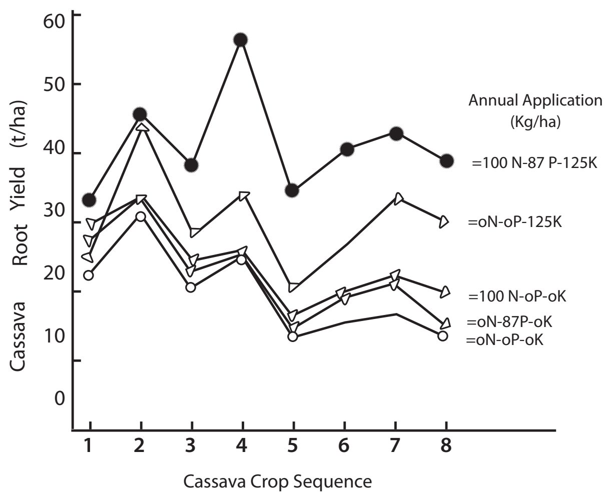


Figure 1A - Yield decline due to continuous cassava production in unfertilized cassava plots in three time series in Thailand (Sittibusaya et al., 1998). Figure 1B - Effect of various levels of annual application of N, P, and K on cassava root yield during eight consecutive croppings in CIAT-Quilichao, Colombia (Anonymous, 1988

However, with appropriate fertilizer application, good yields can be maintained, even over long periods of continuous cropping. Figure 1B illustrates the results from a series of trials at differing fertilizer rates over an 8-year period. While the yields vary based on seasonal conditions, the yield decline can be minimized.
Over the years, many participatory trials have shown that even a relatively conservative application of fertilizer in the appropriate balance of N:P:K; applied at the right time; and with appropriate placement; can provide farmers with very attractive returns on investment. Farmers in Cambodia are often not aware of the correct type of fertilizer; an economically appropriate rate; or when to apply the fertilizer to the crop. Furthermore, these fertilizer are frequently not available in accessible locations for smallholder farmers.

Myth 3: Cassava has no serious pest and disease issues in Southeast Asia.

Reality: Cassava originates from South America. When it arrived in Asia it benefited from a long period of absence of pests and diseases. However, this period is over. In the recent past, several phytosanitary health concerns have been becoming more serious throughout the entire region. Cassava witches' broom, a phytoplasma disease, has now spread across cassava production areas from Thailand to the Philippines.
Table 3. Main pest and disease pressures in Southeast Asian cassava.

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PEST/DISEASE	FIRST RECORD	ESTIMATED YIELD LOSS	DETAILS
Cassava witches broom	1993-Thailand	30-35% yield loss (Minato, unpublished), 25-30% loss of starch content (Hoat et al., 2011).	Caused by 16Srl phytoplasma. Causes severe stunting.
Papaya mealybug	2008-Indonesia	10-40% yield loss (2013, India).	Detected in Cambodia in 2010. Can live on more than 80spp. of plants.
Striped mealybug	1942-Thailand	Estimated at 20-80% (Bellotti et al., 2013).	Can colonize over 272 plant spp. including coffee, guava, cashew, citrus, and cassava.
Cassava mealybug	2009-Thailand	Up to 84% loss recorded. Initial estimates from Thailand 20-40% (2010).	Can colonize at least 9 different agricultural species.
Sri Lanka Cassava Mosaic Virus	2015- Cambodia (previously India and Sri Lanka)	Little research on impacts in Southeast Asia.	Potentially devastating disease causing leaf mottling, loss, and plant death. High potential impact.

Myth 4: The same improved cassava varieties will perform well in all locations

Reality: There are many cassava varieties grown throughout the world. Farmers have selected these varieties for a range of reason including high yields, good eating qualities, ease of peeling, early maturity, and resistance to pest and disease. Varieties will perform differently in different agro-ecological zones depending on factors such as soil type, climate, and agronomic management practices. Cassava breeders continue to develop new varieties that are better adapted to environment and biological stress. There are also new varieties being developed for specific markets and applications.

New varieties should be evaluated by different value chain actors (farmers, processors, and consumers) to make sure they meet the requirements of the final users. Letting farmers grow and evaluate new varieties together with their current varieties is a good way to involve farmers directly and will ensure their suitability for different agro-ecological zones under the management practices that farmers have adopted. Value chain actors can help diffuse new varieties through their network of farmers, therefore coordinating the results of variety evaluations can help inform these stakeholders of the best potential varieties in different regions in Cambodia.
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Way forward

The expansion of cassava area in Cambodia has been accompanied by great economic benefit. However in light of low recent prices and land constraints, it is now necessary to rethink cassava production and processing industries in Cambodia. Cassava production should therefore be considered as a component of the complex picture of smallholder livelihood strategies. Meanwhile, the cassava industry must move forward with full consideration of the economic, social, phytosanitary, and environmental implications of continuous large-scale mono-culture production system to help minimize production and marketing risk to ensure sustainable rural livelihoods.
The development and adoption of a sustainable cassava sector will require stronger linkages between stakeholders in the cassava value chain with access to accurate information about the opportunities and constraints in the local context that farmers face and market demand.

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