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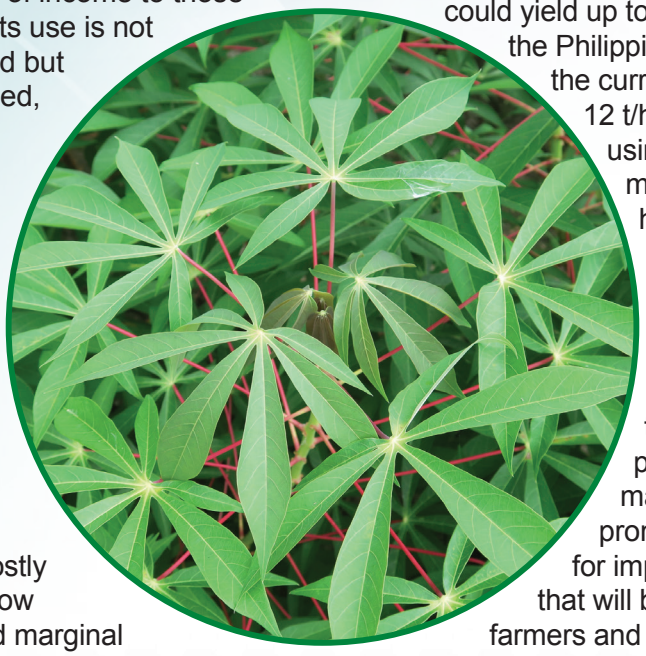
FERTILIZER APPLICATION IN CASSAVA:

Why it is Important

Cassava is the third most important source of calories in the tropics, after rice and maize. It is an important crop to rural communities in the tropics because of the crop's capacity to adapt to soils of marginal fertility and uncertain rainfall. Furthermore, cassava is an important source of income to those communities as its use is not limited to just food but also as animal feed, and as important raw material for the production of industrial products such as glue, textile, and plywood. Millions of people in Africa, Asia, and Latin America depend on cassava.



As cassava is mostly cultivated under low fertilizer input and marginal soil and environmental conditions, the current (2016) global average yield of cassava is less than 12 t/ha[1]. In Southeast Asia, cassava is grown in 10 countries with a regional average close to 22 t/ha, but only 4 of the 10 countries have yields higher than 20 t/ha. Yield in the other six countries are within 4 to 19 t/ha, as majority of the farmers in those countries apply very little or no fertilizer at all to their cassava crop.

More than 8 million farmers, mostly smallholders, grow cassava in Southeast Asia[2]. In this region, cassava has a significant potential for intensification with its production changing from a traditional food crop to an export-oriented industry that responds to strong external market demands. The cassava production sector delivers into these growing markets by a combination of area expansion, use of higher yielding varieties, and partly by trying to intensify through improved management.

Under optimum conditions, cassava could yield up to 90 t/ha[3]. In the Philippines, where the current yield is 12 t/ha, field trials using 4R nutrient management and high-yielding varieties produced yields of up to 58 t/ha. The huge yield increase that optimal plant nutrition can make indicates a promising opportunity for improving yields that will benefit both farmers and consumers.

Closing cassava yield gaps will benefit both producers and consumers.

Such opportunity will allow cassava farmers to exploit the emerging new markets for cassava products and improve their livelihood and income.

Although cassava can grow in soils where other field crops would not survive, cassava needs all the essential plant nutrients to complete its life cycle. When cassava is grown on the same field for many years without adequate application of fertilizer nutrients, the crop will continue to extract whatever nutrients are available in the soil, which will eventually result in very low yields and even soil degradation.

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“ Cassava benefits from nutrients, especially potassium, to produce high yields and improve quality of cassava products. ”

During the first few years of continuous cassava cultivation, the response of cassava to the application of fertilizer nutrients nitrogen (N), phosphorus (P), and potassium (K) varies from site to site depending largely on the original fertility characteristics of the soil. But with continuous cultivation over several years, such as the condition of many cassava areas in Southeast Asia, the response to particular nutrients will subsequently depend more and more on the nutrients that are depleted most by crop removal (**Figure 1**).

Cassava nutrient removal is largest for K and smallest for P. On average, 7 kg N, 2 kg P, and 11 kg K are taken by the whole plant (consisting of roots, stems, and leaves) to produce one ton of fresh root yield[5]. Assuming that the stems and leaves are retained in the field, the harvested roots take away from the field 1.2 kg N, 0.5 kg P, and 3.3 kg K per ton of fresh root yield. This means that at the current global yield of 12 t/ha, 14 kg of N, 6 kg of P, and 40 kg K per hectare are being taken away from the fields with just the harvested roots. Thus, a high-yielding cassava producing 40 t/ha will remove with its roots 48 kg N, 20 kg P, and 132 kg K per hectare. Yet, before a cassava crop could produce the 40 t of roots, it will need to take up 280 kg N, 80 kg P, and 440 kg K. Such demand for nutrients by the crop, no matter the initial fertility of the soil, can only be sustained for many years with adequate fertilizer application.

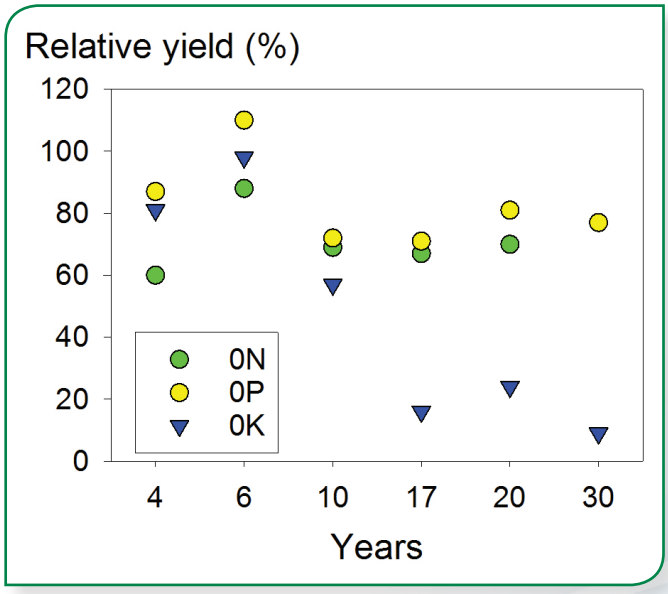

Figure 1. The relative yield of cassava in long-term, nutrient omission treatments - no nitrogen (ON), no phosphorus (OP), and no potassium (OK) relative to the yield in the fully-fertilized NPK treatment in Southeast Asia[4].

Although mostly not fertilized, cassava is as responsive to fertilizer applications as other crops. In the short term, balanced application of nutrients can improve yields in low fertility soils. In the long term, regular application of nutrients in sufficient and balanced amounts can maintain high yields and prevent soil degradation. In particular, improving K nutrition of low fertility soils can significantly increase cassava root yield since this nutrient is taken up in large amount by the crop. Furthermore, K nutrition can improve starch content of cassava and reduce its cyanide content. As root cyanide decreases with higher levels of K, application of K fertilizer to low-K soils will help minimize health hazards, particularly when fresh cassava is used for human consumption.

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