

# Facts on Provitamin A (PVA) Maize Tanzania



**Building  
Nutritious  
Food Baskets**

## What is PVA Maize

PVA maize is a special type of maize that is rich in Beta-carotenes. Beta-Carotene is an organic, strongly colored red-orange pigment abundant in plants and fruits. Beta-carotene is what gives PVA maize an orange colour and is converted to Vitamin A in the body after consumption.

PVA maize is in many ways the same as the white, yellow and other maize types, but the big difference is that it provides additional nutritional benefits of Vitamin A, which other maize types do not provide.

## Is PVA Maize new in Tanzania?

Yellow coloured maize types exist in many parts of Tanzania but they do not contain sufficient levels of Provitamin A. PVA maize varieties that contains Provitamin A are indeed new in Tanzania. Two new medium maturing varieties (Meru VAH517 and Meru VAH519) have already been released by a company called Meru Agro Tours and Consultancies in 2016. Four more hybrids are being tested for release by Tanseed International.

## Where did PVA maize come from?

The PVA maize was developed by the International Maize and Wheat Improvement Center (CIMMYT) in collaboration with Harvest Plus. It was tested and released by Meru Agro in Tanzania under the auspices of Tanzania Official Seed Certification Institute (TOSCI). The project Building Nutritious Food Baskets (BNFB) is partnering with other stakeholders to upscale production, processing and consumption of PVA maize in Tanzania.

## How is the PVA Maize seed produced in Africa?

CIMMYT and partners developed PVA maize through a conventional plant breeding process that exploits natural variations existing within the crops. Plant breeders identified parent varieties with high Provitamin A and then crossed varieties over several generations to produce plants that have the desired nutrient and agronomic traits for example high Provitamin A content, high yielding and disease resistant.

## I would like to grow PVA maize, where can I obtain seed from?

PVA maize is not yet available for farmers to grow in Tanzania however, it will soon be available in most shops that sell seeds (Agrovets) and from Meru Agro and Tanseed International seed companies. The seeds are at multiplication and testing stage to ensure farmers get the best seed possible. The seed will be available in the next couple of seasons.

## How can I grow PVA Maize?

All agronomic practices for growing PVA maize are the same as those of white maize. However; if PVA maize is grown close to white (less than 200m) transfer of pollen will result. White maize will have yellow beeps (Xenia effect). A minimum of 5 guard rows of white is recommended to reduce this effect.

## Who should consume PVA Maize?

In Tanzania, Vitamin A Deficiency (VAD) is recognized as one of the most serious micronutrient deficiencies (hidden hunger) affecting many people but the most vulnerable are children under five years, pregnant and lactating mothers. It is estimated that nearly 1 in every 5 children under 5 years of age are Vitamin A deficient and same is true for women of child bearing age (15-49 years old).

Vitamin A deficiency is widely prevalent in Africa and afflicts millions of children, resulting in morbidity, nutritional blindness, and even death. Even mild levels of Vitamin A deficiency (lack of Vitamin A) may damage our health leading to decreased school performance in children and may lead to poor productivity for adults.

As a staple food, maize is consumed by most people in Tanzania. Maize is also one of the most genetically diverse crops in the world, and can therefore be a cheap and sustainable source of Vitamin A especially for the vulnerable rural poor population.

## What are the qualities of PVA maize?

- i) Rich in provitamin A (ranges from 8ppm-14ppm)
- ii) The varieties released in 2016 are intermediate maturing varieties ((100-110 days))
- iii) Colour ranges from deep yellow to deep orange
- iv) Very good resistance to crop pests and diseases
- v) Grain yields as good as the white maize varieties



### Can fertilizer used to grow PVA maize affect PVA levels?

No. Fertilizer will not affect the levels of Provitamin A in the maize because the beta-carotene is carried in the germplasm.

### Why not breed PVA maize which is white in colour?

The orange colour is indicative of the levels of Provitamin A (Beta-carotenes), which are converted into Vitamin A in the body, after consumption. The deeper the orange colour, the more the Beta-carotenes in the maize. This is similar to carrots, pawpaw, pumpkin, mango etc.

### How does yield levels of PVA Maize compare with existing white varieties?

The yield of the two released varieties of PVA maize compare well with white maize in Tanzania. Meru VAH517 variety yields 7.5t per ha and Meru VAH519 variety yields 5.9t per ha.

### How does one avoid cross contamination between white and PVA varieties grown close to each other?

There are three ways of avoiding cross contamination.

- Isolation by time (planting the different varieties giving a gap of four weeks between varieties of the same maturity group)
- Isolating distance (plant varieties 200m apart), and
- Isolation by varieties with different maturities (early maturity next to late maturity varieties)

### Does PVA Maize require special care for post-harvest handling and processing?

Special care should be taken after harvesting PVA maize to reduce losses of Provitamin A in the maize during storage and processing. PVA maize should be kept under cool and shady conditions. When cooking, prolonged heating and long-term soaking in water can reduce the amount of Provitamin A in the maize.

### Has there been problems (health or otherwise) with consumption of white maize that prompted release of PVA maize?

No. Vitamin A deficiency is what prompted the development of Provitamin A-rich maize. It was assumed that if Vitamin A could be carried by a food crop that is popularly consumed by affected populations, the Vitamin A deficiency problem could be addressed. White maize is still a good source of calories that provide energy but is not a good source of micronutrients. PVA maize combines the two; energy and micronutrients.

### Can I suffer from Vitamin A toxicity from consuming too much PVA Maize?

Vitamin A toxicity especially in Africa is rare, but real. It can occur when it lasts for long periods of time, especially in areas where Vitamin A supplementation and food fortification programs co-exist. However, toxicity is not a major issue when using Beta-carotene as a source of Vitamin A e.g. PVA Maize. The body can regulate how much Vitamin A to make from Beta-carotene based on its needs. If the Vitamin A status is within the normal limits, the body will reduce the expression of enzymes involved in Beta-carotene cleavage to Vitamin A.

### Is Vitamin A retention in PVA Maize affected by different cooking methods?

The nutritional value of foods generally changes with processing and cooking, and Vitamin A is particularly susceptible to degradation when exposed to air, light, and heat. However, breeding targets are set to take into account nutrient stability and retention of Provitamin A in maize, based on typical processing, storage, and cooking practices. Nutrition research suggests that PVA maize retains sufficient micronutrients to improve human health even after cooking. However, cooking methods that involve high heat levels and long-term soaking in water will deplete the amount of PVA maize.

### Is PVA Maize genetically modified (GMO)?

All of the biofortified crops released in Africa to date have been developed using conventional plant breeding including PVA maize. Conventional breeding methods exploit natural variations existing within the crops. Plant breeders identify parent varieties with high vitamin or mineral levels, and then cross varieties over several generations to produce plants that have the desired nutrient and agronomic traits.

However, please note biofortification also includes the use of transgenic technology, which led for example to biofortified Gold Rice, Super Sorghum and Vitamin A Bananas. These transgenic crops have not been commercially released in Africa yet. Transgenic approaches face regulatory challenges in Sub-Saharan Africa (SSA).

PVA Maize in Tanzania was developed using conventional plant breeding. In this case naturally occurring germplasm of orange maize carrying high levels of Vitamin A was isolated from the seed bank and crossed with other varieties to improve other traits such as yield, pest, disease and drought tolerance.



#### CONTACTS

Dr James Gethi  
Maize Breeder  
The International Maize and Wheat  
Improvement Center (CIMMYT)  
J.Gethi@cgiar.org

Joyce Maru  
Capacity Development and Communication Specialist  
Building Nutritious Food Baskets Project (BNFB)  
j.maru@cgiar.org

