Functional Agriculture

Background of functional agriculture research

- Definition of hidden hunger (1st paragraph)
- Effects of hidden hunger (2nd, 3rd paragraphs)

Methods to solve the problem of hidden hunger

Three techniques to tackle hidden hunger

Biofortification as main theme of functional agriculture

- Definition of biofortification
- Goal of biofortification

Forms of biofortification

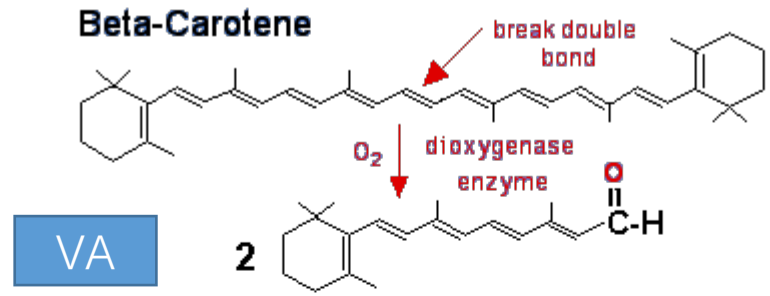
Agronomic biofortification

mineral fertilizer

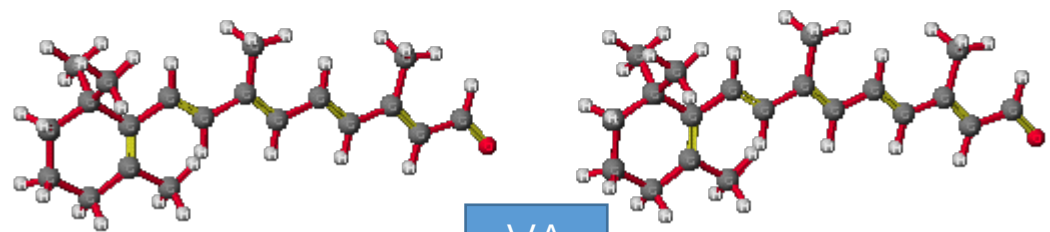
Conventional breeding

- HarvestPlus first micronutrient-rich crop released in 2007-9
- Dissemination of orange sweet potato led to a **vitamin A** deficiency reduction from 50% to 12%
- High rates of **adoption** and **consumption**


Beta Carotene = Vitamin A?


Beta-Carotene
break double bond
O_2
dioxygenase enzyme
O
C-H
2

VA



VA

Conventional breeding

Crop produced through **conventional breeding** rich in **β-carotene**

- HarvestPlus first micronutrient-rich crop released in 2007-9
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Mozambique: Women and children taste and compare different sweet potato varieties

Dickson with his wife and children

Dickson Mbogo

From Casual Laborer to Farmer

I combined what I knew about sweet potato with what we had been taught. This was my turning point! At the end of five months, my method gave me an income that was much more than I earned from casual labor work, so I decided to take on orange sweet potato production full time. I managed to pay school fees for all my children on time. I even bought a motorbike to take my produce to the markets. We have enough orange sweet potato to eat every day. My wife has a small shop where she sells pancakes made from the sweet potato.

Funding Partners

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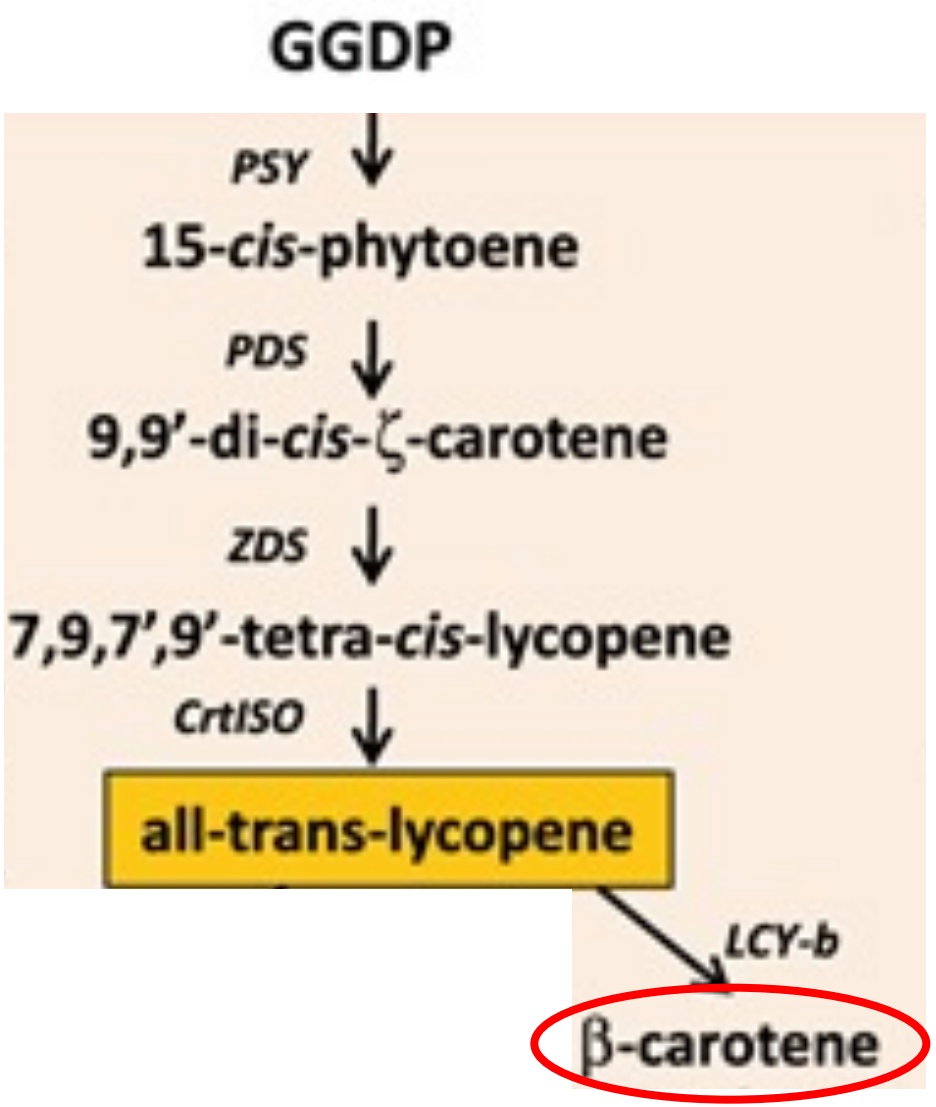
Molecular breeding

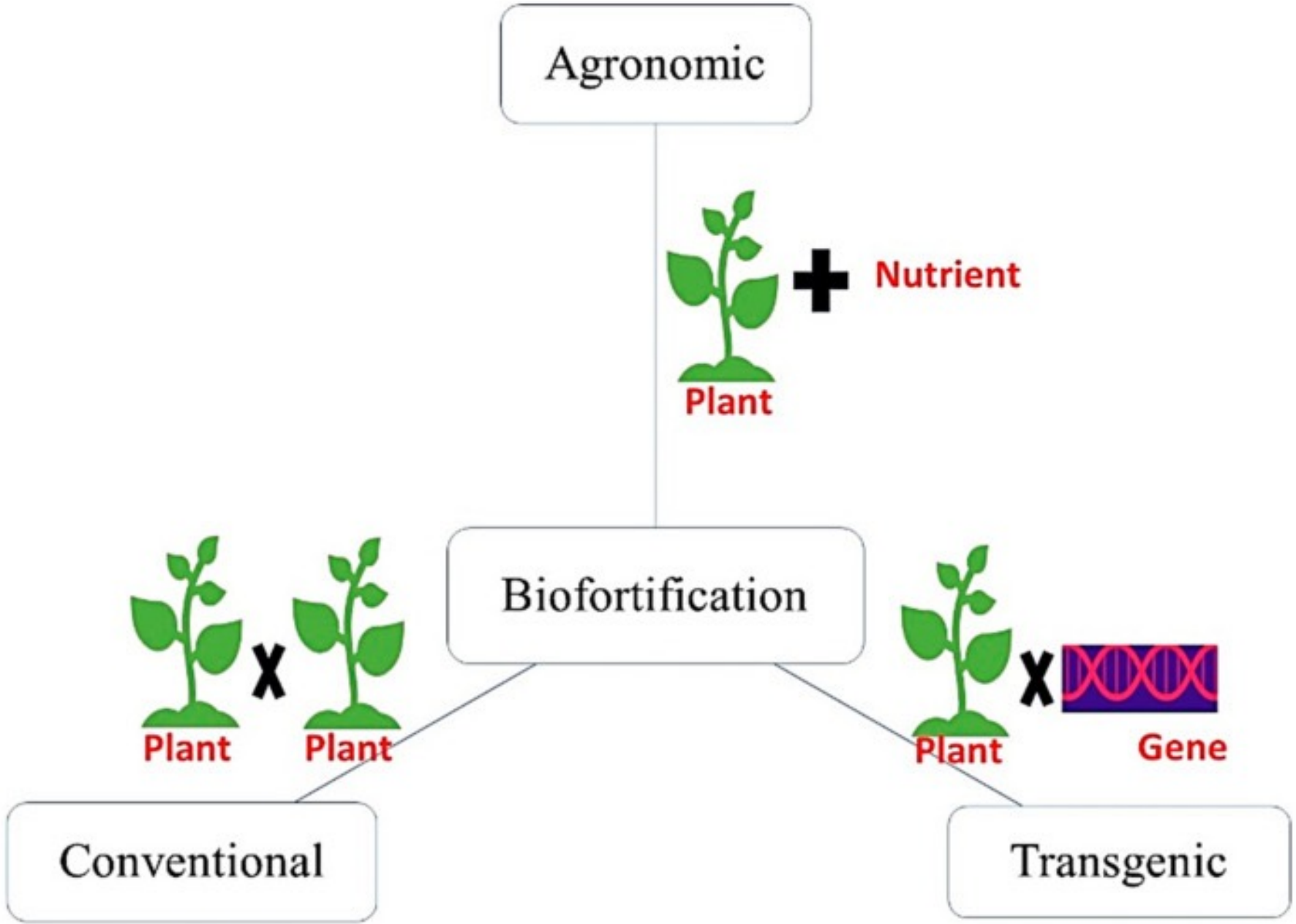

GGDP
PSY
15-cis-phytoene
PDS
9,9'-di-cis-ζ-carotene
ZDS
7,9,7',9'-tetra-cis-lycopene
CrtISO
all-trans-lycopene
LCY-b
β-carotene

Proof of concept studies – Golden Rice, India

Crop produced through **genetic engineering** to biosynthesize **β-carotene**, a precursor of **vitamin A**

- New way to address **vitamin A** deficiency
- Successful production of *Golden Rice 1* and improved *Golden Rice 2* (produces up to **23 times** more β-carotene)
- Confirmed **bioavailability:** 72g/day is enough to avoid VAD

- Presented in 2000 and still **not grown commercially** in any country


Agronomic
Plant
Nutrient
Biofortification
Plant
Plant
Plant
Gene
Conventional
Transgenic