



# BETA-CAROTENE IN GOLDEN RICE: A PRIMER

Research shows that Golden Rice is the same as ordinary rice plus the added benefit of beta-carotene, a precursor of vitamin A, in its grain. To understand its potential impact on human health, let's compare the beta-carotene in Golden Rice with the beta-carotene in other vitamin A rich food sources.

There are two types of vitamin A that are found in the diet. Preformed vitamin A is found in animal products such as meat, fish, poultry, and dairy foods. Provitamin A is found in plant-based foods such as fruits and vegetables. The most common type of provitamin A is beta-carotene.

## MEASURING BETA-CAROTENE FROM FARM TO PLATE

The beta-carotene content of any vitamin A rich food -whether it's yellow fruits, leafy green vegetables, or Golden Rice -changes depending on storage time and processing. To ensure more accurate projections of its nutritional potential, the beta-carotene content of Golden Rice is monitored at different stages.



1 Beta-carotene content is highest upon harvest, but gradually reduces until it reaches a stable level two months after harvest.



2 Beta-carotene content largely stabilizes after two months of storage and is measured.



3 Exposure to heat affects beta-carotene content to some extent. Measurements on reductions caused by parboiling and cooking are also recorded.



4 Remaining beta-carotene content at this stage can provide 30-50% of the estimated average requirement (EAR) for vitamin A of young children and pregnant and lactating women.

# BETA-CAROTENE AND THE BODY

Beta-carotene is an ideal source of vitamin A because the human body only converts as much as it needs. Rice has a simple and easily digestible food matrix, which allows for a high bioavailability and bioconversion of beta-carotene to vitamin A.

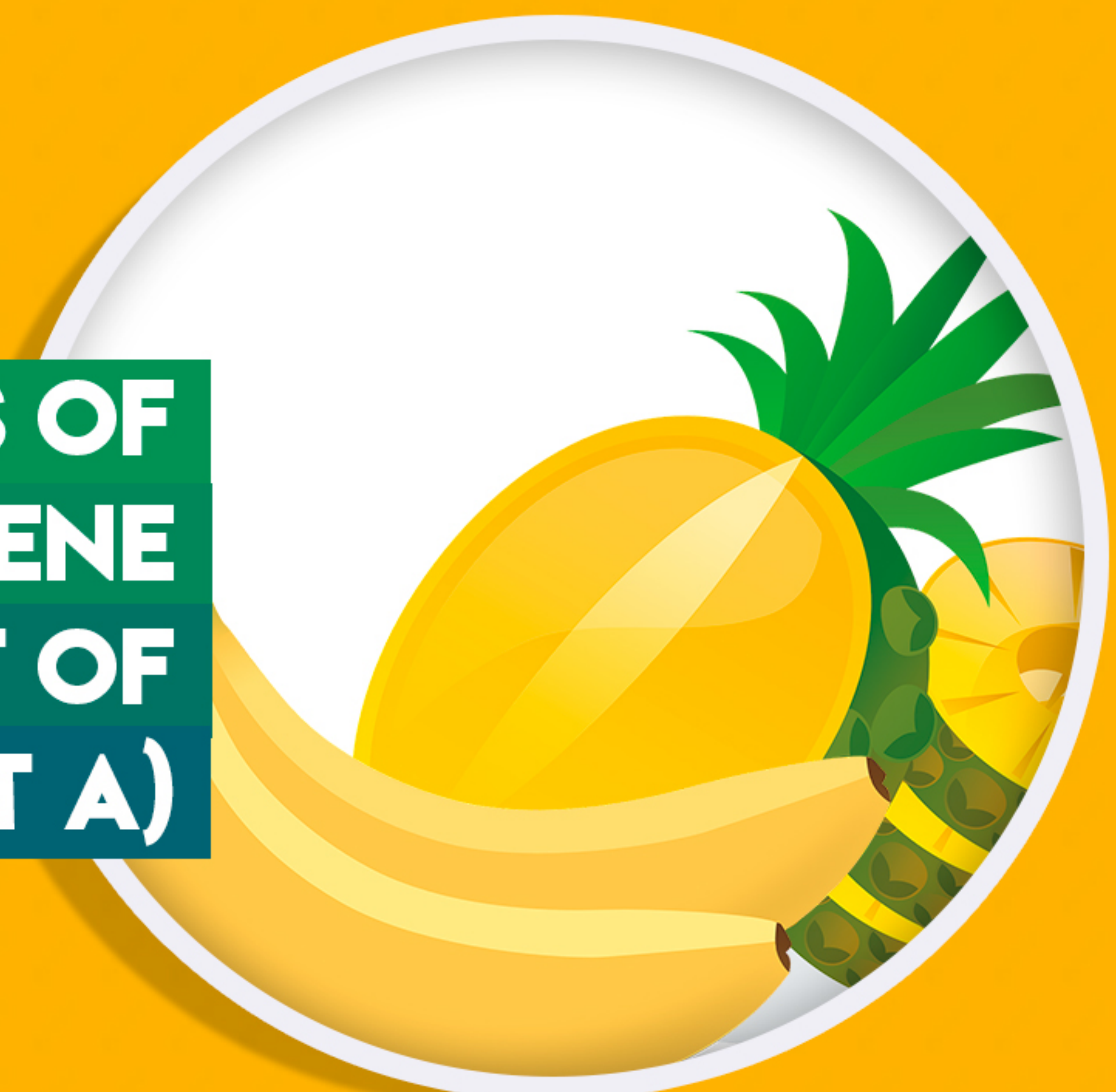
28 UNITS OF  
BETA-CAROTENE  
= 1 UNIT OF  
RETINOL (VIT A)



3.6 UNITS OF  
BETA-CAROTENE  
= 1 UNIT OF  
RETINOL (VIT A)



12 UNITS OF  
BETA-CAROTENE  
= 1 UNIT OF  
RETINOL (VIT A)



## THE SMALL AMOUNTS OF BETA-CAROTENE IN GOLDEN RICE ARE MORE EFFICIENTLY CONVERTED BY THE HUMAN BODY INTO VITAMIN A.

BETA-CAROTENE

VITAMIN  
A

References: Am J Clin Nutr. 2007 Apr;85(4):1112-20, J. Agric. Food Chem.2016, 64 (13) 2727-2736, J. Agric. Food Chem. 2019, 67 (28) 7986-7994



Despite the success of existing nutrition interventions, vitamin A deficiency continues to be the leading cause of preventable childhood blindness and increased risk of infection for over **190 million children worldwide**.

Golden Rice and other rice biofortification initiatives can serve as a complementary pathway to improved nutritional status.