

# GOLDEN RICE

**GOLDEN RICE PROGRAM: Delivering Golden Rice to Filipino Farmers and Consumers**



# THE ROAD TO GOLDEN RICE



# What is Golden Rice?

- Golden Rice is an ordinary rice improved with beta carotene (a source of vitamin A) and gives the grain its golden color.
- Golden Rice is developed through genetic engineering and is intended to be introgressed into popular, high-yielding rice varieties.



Paddy

Unpolished

Polished

# Is Golden Rice safe?



- YES. Golden Rice had undergone rigorous biosafety regulations (Health Canada, FSANZ, US-FDA, DA-BPI).
- Golden Rice is as safe as ordinary rice, with the added benefit of beta-carotene in the grain.

# Is there enough beta carotene in Golden Rice?

One cup of cooked “Golden Rice” can provide 30 to 50 percent of the estimated average requirement (EAR) of vitamin A for preschoolers, and two cups for adults (pregnant and lactating mothers).



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.

# Potential contribution of Golden Rice

Potential contribution of Golden Rice to vitamin A RNI and EAR in the Filipino diet.

| Physiologic Group  | Mean one-day intake of rice (g) | Vitamin A Contribution from Golden Rice ( $\mu\text{g}$ ) | RNI (%) | EAR (%) |
|--------------------|---------------------------------|---|---------|---------|
| Children, 6 mo-5 y | 87.3                            | 63.9  | 16.0    | 32.1    |
| Children, 6-12 y   | 178.6                           | 130.7   | 29.1    | 40.8    |
| Pregnant Women     | 234.7                           | 171.8   | 19.1    | 39.7    |
| Lactating Women    | 281.9                           | 206.3   | 20.6    | 47.7    |

Notes: Beta-carotene concentration after 3 months of storage: 3.5  $\mu\text{g}/\text{g}$  (IRRI, 2021)

Beta-carotene conversion factor: 4.78 (IRRI, 2021)

Loss from cooking is not considered

DOST-FNRI and IRRI, 2021 (unpublished).



# Content, benefits



Beta carotene content:  
**1 cup Golden Rice = 12 cups kangkong**

Golden Rice can improve the diets of children—more than half of whom are not consuming sufficient vitamin A.



Sources: Tang et al, Am J Clin Nutr 2009; Tang et al, Am J Clin Nutr 2005. Slide courtesy of HKI.

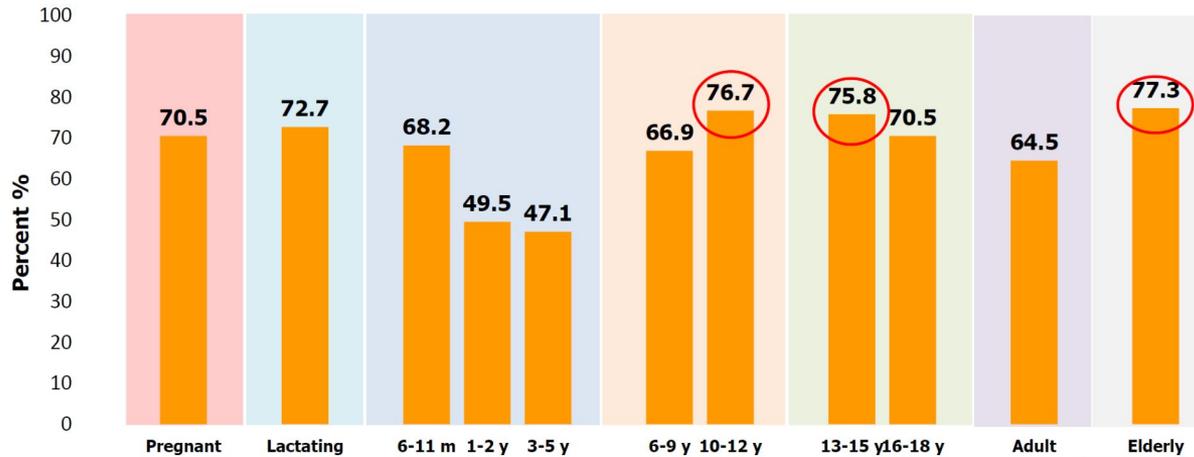


# How can Golden Rice help?

- Golden Rice can provide an additional source of vitamin A in the diet of the Filipinos.
- With daily intake, it can be a sustainable source of Vitamin A.
- Hence, a promising complementary intervention to help address VAD

# Our diet typically lacks vit A

Proportion of Population Groups with Inadequate Dietary Intake of Vitamin A based on EAR: Philippines, 2018-2019



Department of Science and Technology  
FOOD AND NUTRITION RESEARCH INSTITUTE

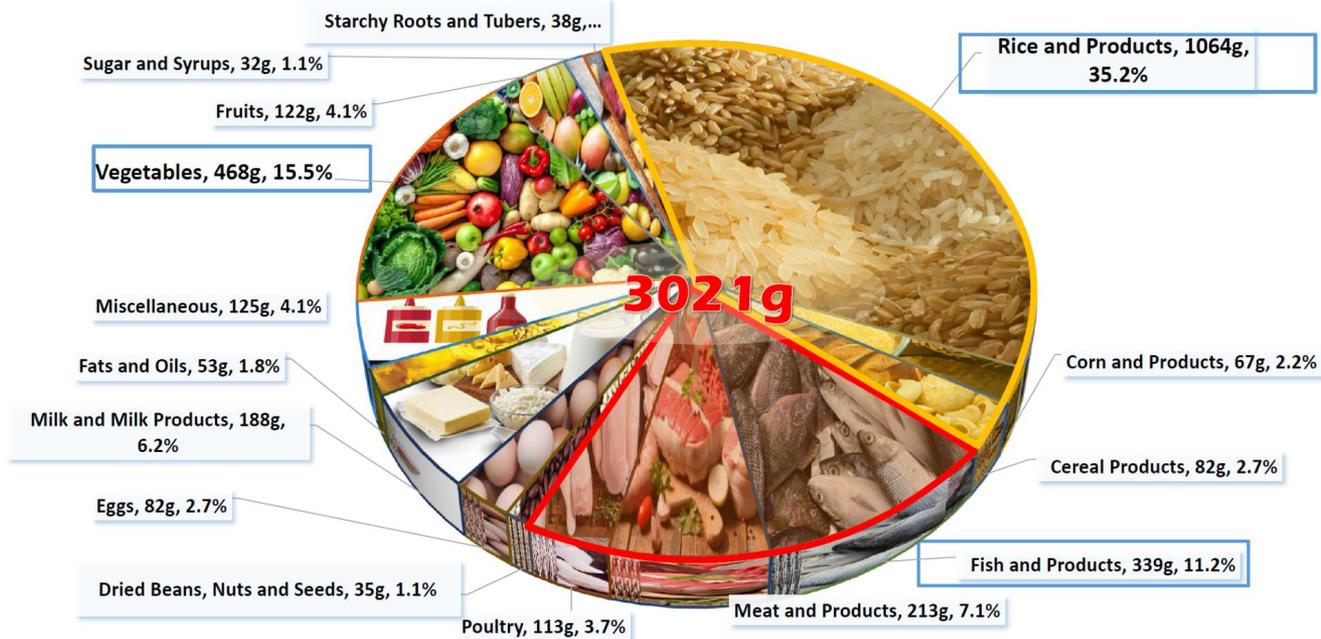


Source: DOST-FNRI Expanded National Nutrition Survey 2019



# Rice and the Filipino diet

Mean **one-day household food intake** by food group and percent contribution to total intake: Philippines, 2018-2019



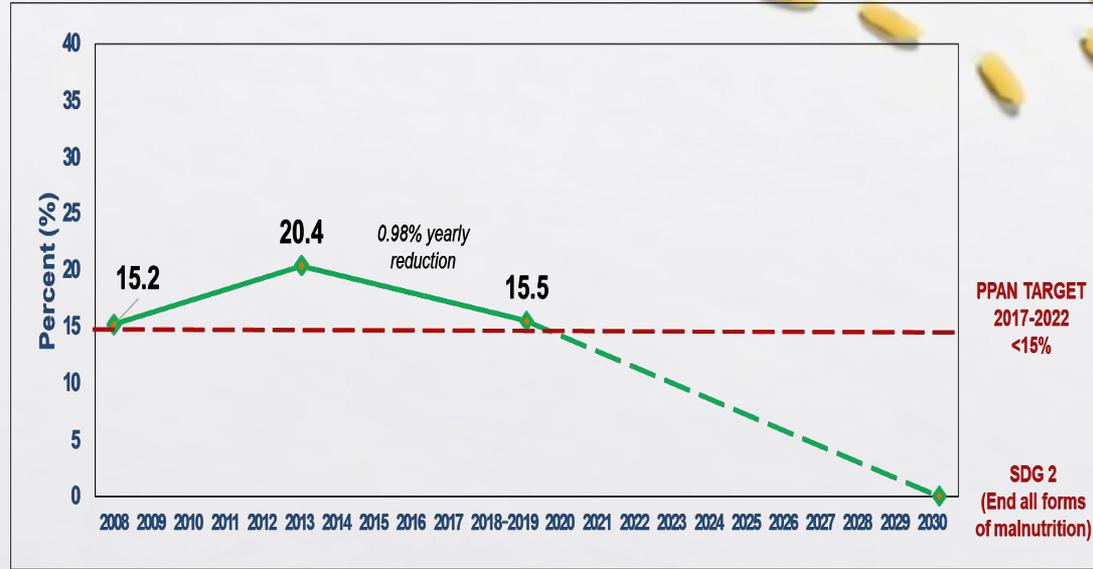
Source: DOST-FNRI Expanded National Nutrition Survey 2019

# Vitamin A Deficiency (VAD)

- VAD is caused by chronic lack of vitamin A in the diet
- Inadequate dietary intake of vitamin A is high in the Philippines
- VAD children also have high prevalence of undernutrition and anemia
- VAD is the leading cause of preventable blindness in children
- VAD also weakens immune system vs infections (diarrhea, pneumonia)

# VAD remains a public health concern in the Philippines

- 15.5% prevalence nationwide
- Age groups at risk of VAD: 6mo-5yr old and pregnant/lactating women
- 13.6% urban vs. 16.9% rural
- 5.5% in wealthy vs. 22.4% in poor households



# Complementary solutions

**Supplementation**  
(Garantisadong Pambata, breastfeeding)

**Diversified diet**  
(community and school gardens)



**Food fortification**  
(Iron-fortified rice, Sangkap Pinoy)

**Biofortification**  
(Golden Rice)

# How is Golden Rice different from ordinary rice?

- Golden Rice is not very different from its conventional counterpart. It is expected to cost same; its beta carotene content is what makes it unique.
- Golden Rice is not expected to require any changes in farm managements or cultivation practices.
- As an inbred variety, GR seeds can be saved for the next planting season.



# What does it taste like?



- Golden Rice tastes like ordinary rice.
- Beta-carotene does not affect the taste, aroma, and texture of rice.

# When and where can I buy Golden Rice?

- As of this time, we are multiplying the seeds following the issuance of a commercial propagation permit.
- Initial deployment of Golden Rice is being carried out this year's wet season planting in priority areas.
- Deployment sites will be increased as soon as more supply of seeds becomes available.



# GOLDEN RICE DEPLOYMENT GOAL

**Goal: Improved food and nutrition security by 2027**

**OVI 1:** 10% share of GR in the total *palay* production in the Philippines, which can meet the rice requirement of 100% of HH at risk of VAD

**OVI 2:** <15% VAD prevalence in the target areas

**Outcome/Purpose: Ensured availability of GR in the market**

**OVI:** 100% of the rice requirement of HH at risk for VAD made available in the market

**Output 1: Increased adoption of GR seeds**

**OVI:** 500K ha planted with GR

**Output 1.1: Seed production**

**OVI:** 20M kg of seeds produced and distributed to farmers]

**Output 2: Increased acceptability of GR**

**OVI:** 100% of the target households at risk of VAD have consumed GR

**Output 2.1: 1 Social marketing**

**OVI:** 1 set of IEC materials and marketing collaterals; product branding and market positioning conducted]

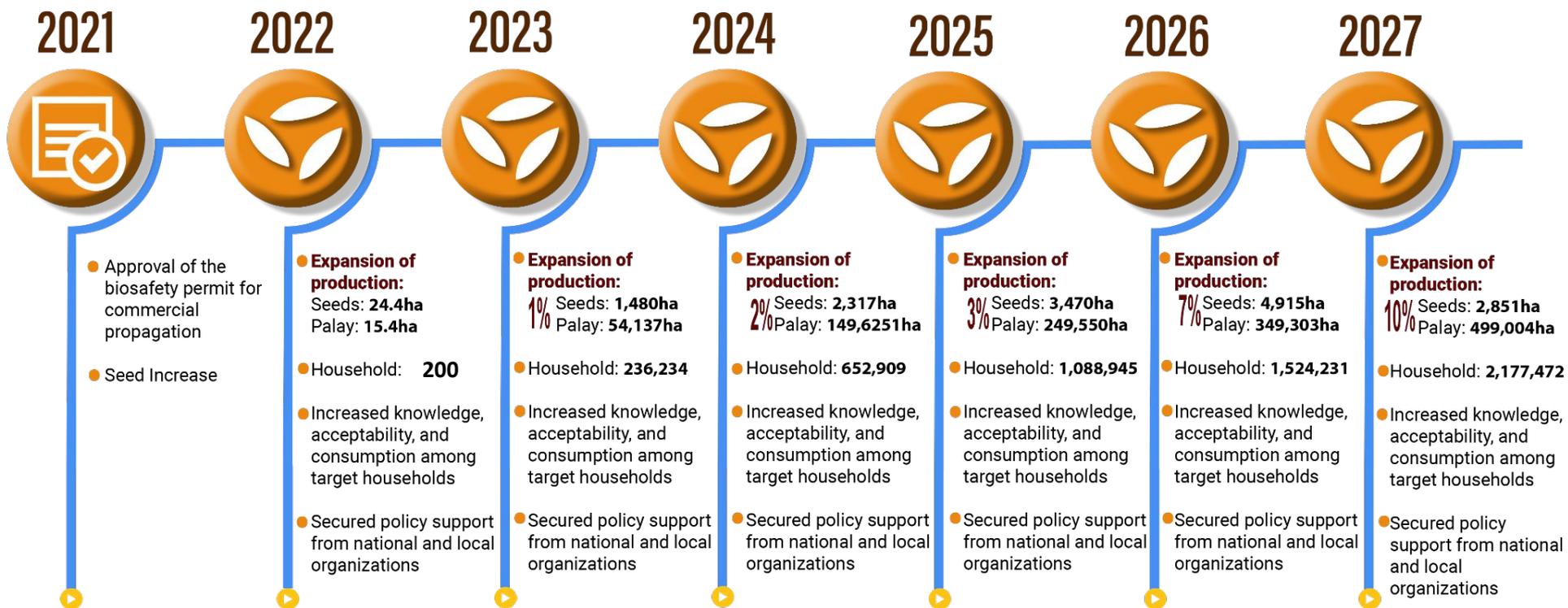
**Output 3: Created enabling environment**

**OVI:** 100% of the target areas have passed an ordinance/resolutions supporting GR

**Output 3.1: Policy advocacy**

**OVI:** 10 Policy outreach activities conducted in all target areas

# Golden Rice Multi-year Deployment Timeline



# Golden Rice Deployment Paradigm

Availability, affordability, and accessibility  
of safe and nutritious rice for all Filipinos at all times

DA Vision

## GUIDING PRINCIPLES:

1. Humanitarian purpose
2. Scientific Integrity & Transparency
3. Partnership and shared responsibility with national and local agencies and orgs
4. Integration of GR in existing agri-nutrition programs
5. Prioritization of LGUs and populations at risk of VAD



# GR Deployment Pathways

## MARKET-DRIVEN APPROACH

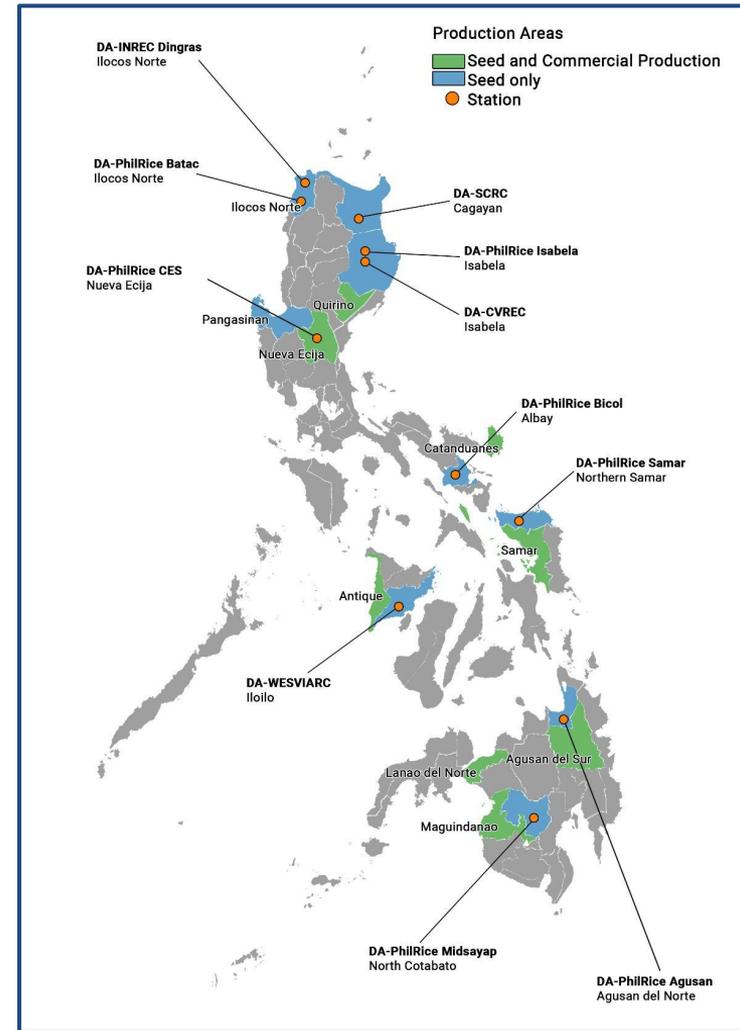
- Value chain analysis
- Commercialization with market players
- Consumer acceptability
- Marketing and promotion
- Product/recipe development

## PROGRAM-BASED APPROACH

- Integration of GR into existing agri-nutrition programs
- Partnership
- Policy advocacy

# 2022 Pilot-Scale Deployment and Seed Production Areas

- **DEPLOYMENT SITES:** 10 regions; 17 provinces, 29 municipalities with 5 DA-REC partners and 19 seed grower- and 14 farmer- cooperators
- **TOTAL WET SEASON PROD'N AREA:** 38.45 hectares – 23.1 ha for seed production, 15.35 ha for commercial production
- **CROP STATUS:**
  - Most of the crops are in reproductive stage for Rc 682GR2E (35.45ha); Maximum tillering for Rc 238GR (3ha; unregistered)
  - Expected harvest: Last week of September to third week of November (Rc 682GR2E)



# First harvest of Golden Rice (Malusog 1) this 2022 wet season

Our farmer-cooperator in  
Maguindanao harvested 7.8  
tons/ha (dry at 11.8% MC)



Golden Rice Grains in  
PhilRice PhilRice

# Communication toolkits



**QUESTIONS & ANSWERS**

SEPTEMBER 2021  
ENGLISH

## Golden Rice



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## Tungkol sa Golden Rice



Ang Golden Rice ay isang uri ng bigas na naglalaman ng beta carotene, ang pinangumulan ng vitamin A, na nagpapaligay ng dilaw o mala-ginto nitong kulay. Dinabok ang Golden Rice upang madaglagan ang vitamin A sa ating pagkain nang sa gayonay matugunan ang suiramin sa vitamin A deficiency o VAD.

**2021**

Chalagang ng 2021 na madalumpag ang pagpapaligay ng Golden Rice sa mga mababang probinsya ng Pilipinas.

**2022**

Opagpapaligay ng Golden Rice sa mga mababang probinsya ng Pilipinas, kasama ang pagpapaligay sa mga mababang probinsya ng VAD.

**2023**

Opagpapaligay ng Golden Rice sa mga mababang probinsya ng Pilipinas, kasama ang pagpapaligay sa mga mababang probinsya ng VAD.



## Frequently Asked Questions

**Gano karaming Golden Rice ang katatagan kong kainin? Masari ba itong makapagdulot ng masamang epekto kung nasabrahin?**

Ang isang tasa ng Golden Rice ay nakapagpapaligay ng 30-50% ng pangangailangan sa vitamin A ng mga batang edad limang buntis, pati na rin ng mga buntis at nagpapaligay sa vitamin A. Ang beta carotene na nagpapaligay ng Golden Rice ay nagpapaligay sa vitamin A lamang walang over-dose o toxicity na malulutas sa sobrang pagkain ng Golden Rice. Atsunang solusyon ng beta carotene ay lubid na katatagan sa pangangailang ng pagkain.

**Kikita ba ang mga magassaka sa pagtatanim ng Golden Rice?**

Ang Golden Rice first ay sinailalita sa mga probinsiyang inibid na bayang ng ating mga magassaka, na katatagan. Big sabihin, walang epekto ang pagkain ng beta-carotene ng Golden Rice sa lasa nito.

**Bilang ito ay isang genetically modified crop, ligtas ba itong kainin ng mga tao?**

Ang Golden Rice ay ligtas kainin, gaya ng ibang mga pagkain na ginagamit ng genetic engineering, sapagkat ito ay ayon sa mga pamamagitan ng mga agrikultura sa Estados Unidos, Australia, New Zealand, Health Canada, at Food United States Food and Drug Administration noong 2018. Samaritang, ang Golden Rice ay dinabokang "light safe" ng ordinaryong bigas" ng DA-BPI noong Disyembre 2018.

**Ayos lang bang mahal sa ibang beray ng bigas?**

Ang Golden Rice sa ibang beray ng bigas, katatagan sa isang magassaka, o hindi kaya mahal sa ibang beray ng bigas. Ang pagpapaligay ng Golden Rice ay lubid din ng ibang ordinaryong beta-carotene.

**Magkaiba ba ang lasa ng Golden Rice sa ordinaryong kainin?**

Isa sa malala ng mga mababang pagpapaligay ng Golden Rice, walang pagkakaiba sa lasa ng kainin. Ang lasa ng Golden Rice ay katatagan ng ibang ordinaryong bigas, ito ay depende sa kung, kung ito ay ginagamit ng pagpapaligay.




# Summary

- Golden Rice is as safe as ordinary rice with the added benefit of beta carotene in the grains.
- Golden Rice will complement existing nutrition interventions to improve the diets of Filipinos.
- Nuanced deployment approach! Deployment sites will be increased as soon as more supply of seeds and grains becomes available.



# GOLDEN RICE

#GoldenRicePH  
#GoldenRiceMalapitNaTo  
#GoldenRiceAprub



Malapit mo  
nang itanim

GUSTO KO 'TO!

Malapit mo  
nang makain

KAILANGAN

NATIN 'TO!

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