



# genetic diversity for sustaining agricultural diversity

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Global Action Plan for Agricultural Diversification (GAPAD)

contribution of agricultural diversification to SDG2 of the UN  
sustainable development agenda 2030

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## the five SDG 2 targets

end hunger and ensure access by all people, in particular the poor and people in vulnerable situations including infants, to safe, nutritious and sufficient food all year round

end all forms of malnutrition, including stunting and wasting in children, and address the nutritional needs of adolescent girls, pregnant and lactating women, and older persons

double the agricultural productivity and the incomes of small-scale food producers

ensure sustainable food production systems and implement resilient agricultural practices

maintain **genetic diversity** of seeds, cultivated plants, farmed and domesticated animals and their related wild species, and ensure sharing of benefits



# maintaining genetic diversity



the world's largest vegetable collection (61,952 accessions)  
442 species from 156 countries

# maintaining genetic diversity



# maintaining genetic diversity



# maintaining genetic diversity



desert research center genebank,  
Egypt



national genebank, Philippines



ICARDA genebank, Syria

# putting food on the table, year-round



*Tuta absoluta*



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## 'Tomato crisis' spreads panic in Nigeria

By **Jacopo Pirisco**, for CNN  
Updated 18:09 GMT (02:09 HKT) May 25, 2016

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### Nigeria's Kaduna state declares 'tomato emergency'

A large pile of fresh, ripe tomatoes.

**Bloomberg** Markets Tech Pursuits Politics Opinion Businessweek Sign in

### Africa's Big Tomato Pickle: Miner Grubs Are Wiping Them Out

A large pile of fresh, ripe tomatoes.

# putting food on the table, year-round



*Tuta absoluta*



Prof Abekutsa in a field of African nightshade



zero-energy evaporative cooler



sundrier



# increasing nutrition

during the last 100,000 years...



...anno 2016



# increasing nutrition

	protein	vitamin A	iron	folate	zinc	calcium	vitamin E
<b>RNI for pregnant women (1<sup>st</sup> trimester)</b>	g 60	µg RE 800	mg 30	µg 600	mg 11	mg 1000	mg α-TE 7.5
<b>percentage of RNI</b>	----- % -----						
rice	0	0	1	2	4	0	0
cassava (root)	2	0	1	5	3	2	0
millet	6	0	2	14	8	0	0
meat (chicken)	<b>37</b>	0	3	1	<b>14</b>	1	3
mungbean	<b>40</b>	2	<b>22</b>	<b>104</b>	<b>24</b>	<b>13</b>	<b>7</b>
vegetable soybean	<b>18</b>	2	<b>13</b>	<b>28</b>	<b>13</b>	4	<b>78</b>
cabbage	3	1	1	10	2	4	2
tomato	2	18	1	3	2	1	7
slippery cabbage	6	<b>106</b>	5	<b>30-177</b>	<b>11</b>	<b>18</b>	<b>58</b>
moringa leaves	7	<b>146</b>	<b>11</b>	<b>49</b>	5	10	<b>65</b>
amaranth	9	<b>160</b>	6	<b>31</b>	6	<b>32</b>	17
jute mallow	10	<b>198</b>	<b>12</b>	<b>21</b>	0	<b>36</b>	36
nightshade	8	<b>101</b>	<b>13</b>	<b>10</b>	<b>9</b>	<b>21</b>	<b>28</b>
vegetable cowpea leaves`	8	<b>193</b>	6	<b>27</b>	3	<b>54</b>	<b>101</b>

**nutrient density**

# increasing nutrition

nutritional outcomes

nutrient density



# increasing nutrition

nutritional outcomes

## indicators:

- **nutrient intake** from all food items consumed
- **dietary diversity score** of major food groups consumed
- **amount/ frequency** of selected food groups consumed

dietary outcomes

nutrient density

X

consumption

phytonutrient content, retention and bioavailability of nutrients

increased productivity, availability, accessibility and consumption

# increasing nutrition

## indicators:

- *anthropometric measurements* (weight, height , BMI)
- *biochemical measurements* (body retinol and iron concentration)
- *clinical signs* (blindness)

## indicators:

- *nutrient intake* from all food items consumed
- *dietary diversity score* of major food groups consumed
- *amount/ frequency* of selected food groups consumed

**nutrient density**

phytonutrient content, retention and bioavailability of nutrients

X

**consumption**

increased productivity, availability, accessibility and consumption

X

**absorption**

enhanced conditions favoring nutrient absorption

**dietary outcomes**

**nutritional outcomes**

WASH, health status, environment, health care

dietary factors (inhibitors/enhancers) and diet patterns

# increasing productivity and income

## net income/ha (USD) from different vegetables in Tanzania

crop	Arusha	Dar es Salaam	Dodoma	Morogoro	Tanga	all regions
tomato	1,603		1,686			1,644
amaranth	4,965	3,302	2,773	2,274	841	2,975
African eggplant	2,679	-	1,017	3,063	491	1,444
African nightshade	8,712	1,629	600	331	1,311	4,196
okra	-	2,224	227	9,090	3,912	3,912
vegetable cowpea	614	2,643	53	1,566	1,566	1,708
sweetpotato leaf	1,372	1,591	1,067	1,113	123	1,253
pumpkin leaf	-	1,017	769	203	-	2,832



Ilala central market in Dar es Salaam

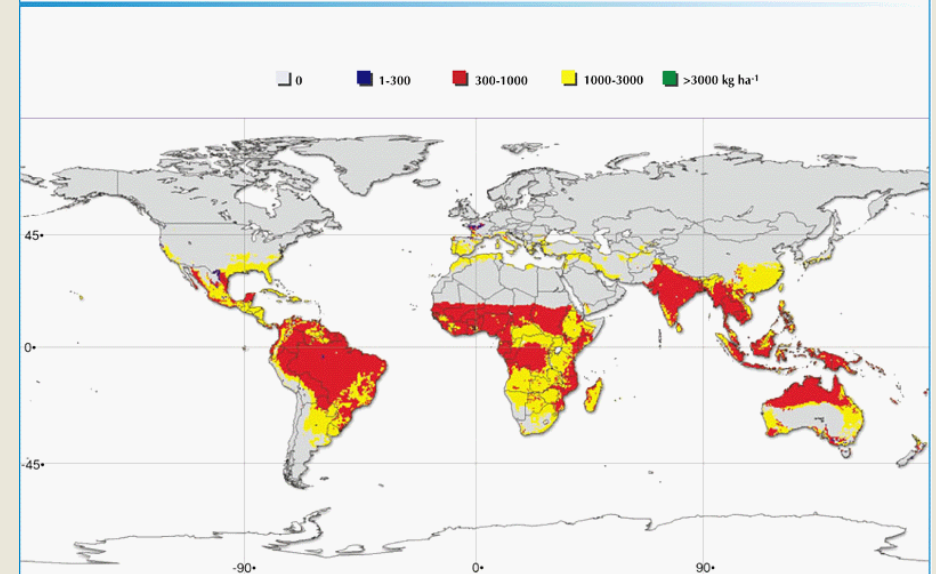


vegetable market in Arusha

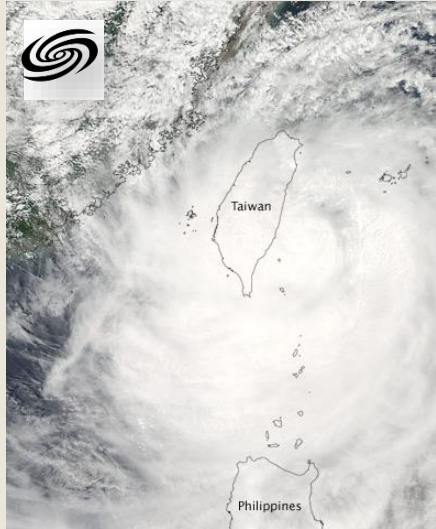
## bambara groundnut (*Vigna subterranea*)



Figure 11 - Predicted pod yield of bambara groundnut (kg ha<sup>-1</sup>) across the world



# increasing resilience

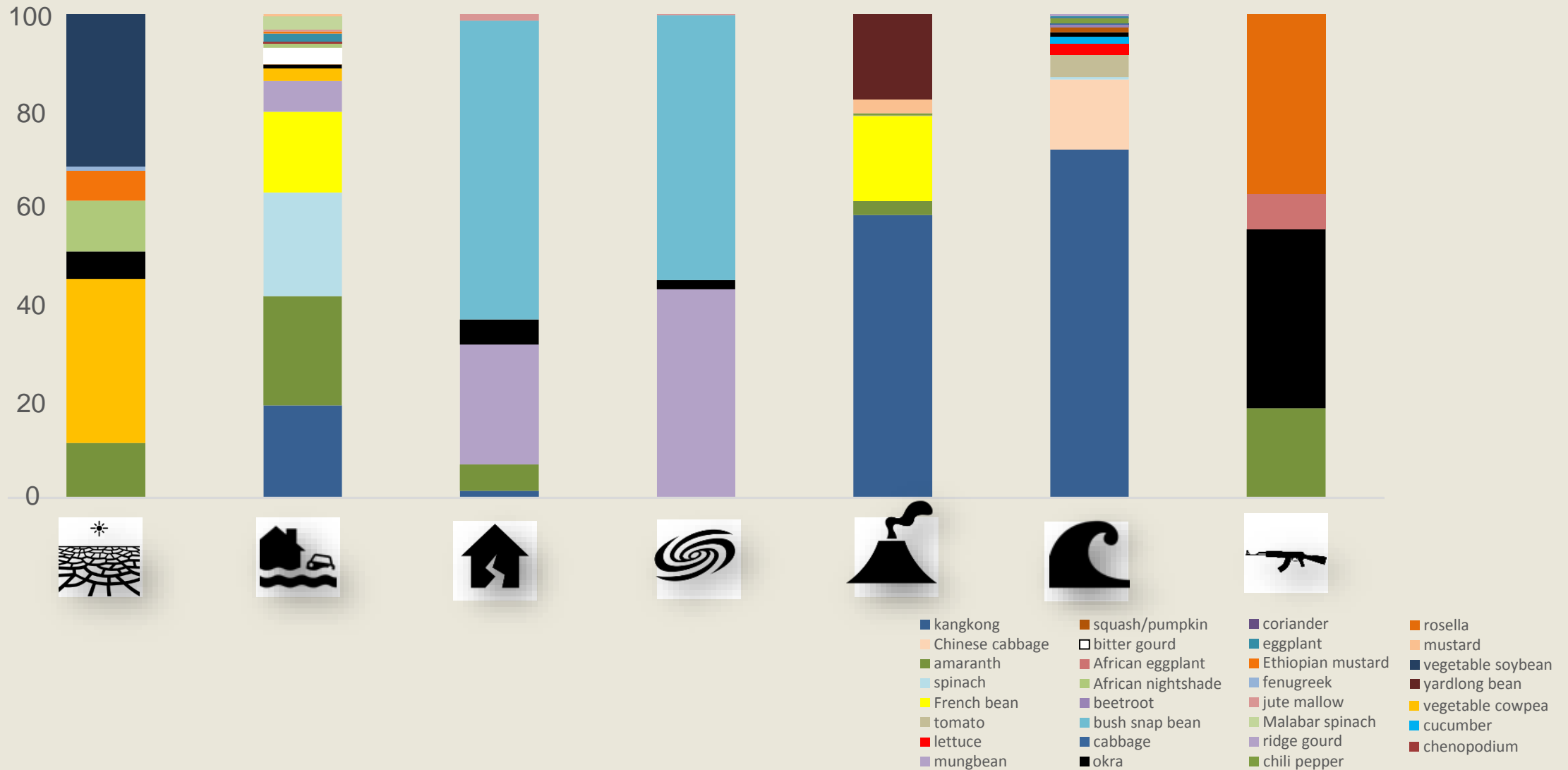




# increasing resilience



# emergency targeting: % of vegetable seeds (kg)



## the five SDG 2 targets

end hunger and ensure **access** by all people, in particular the poor and people in vulnerable situations including infants, to **safe, nutritious and sufficient food all year round**

**end** all forms of **malnutrition**, including stunting and wasting in children, and address the nutritional needs of adolescent girls, pregnant and lactating women, and older persons

double the agricultural **productivity and the incomes** of small-scale food producers

ensure sustainable food production systems and implement **resilient** agricultural practices

maintain **genetic diversity** of seeds, cultivated plants, farmed and domesticated animals and their related wild species, and ensure sharing of benefits

