



VEGETABLES: for Health and Prosperity



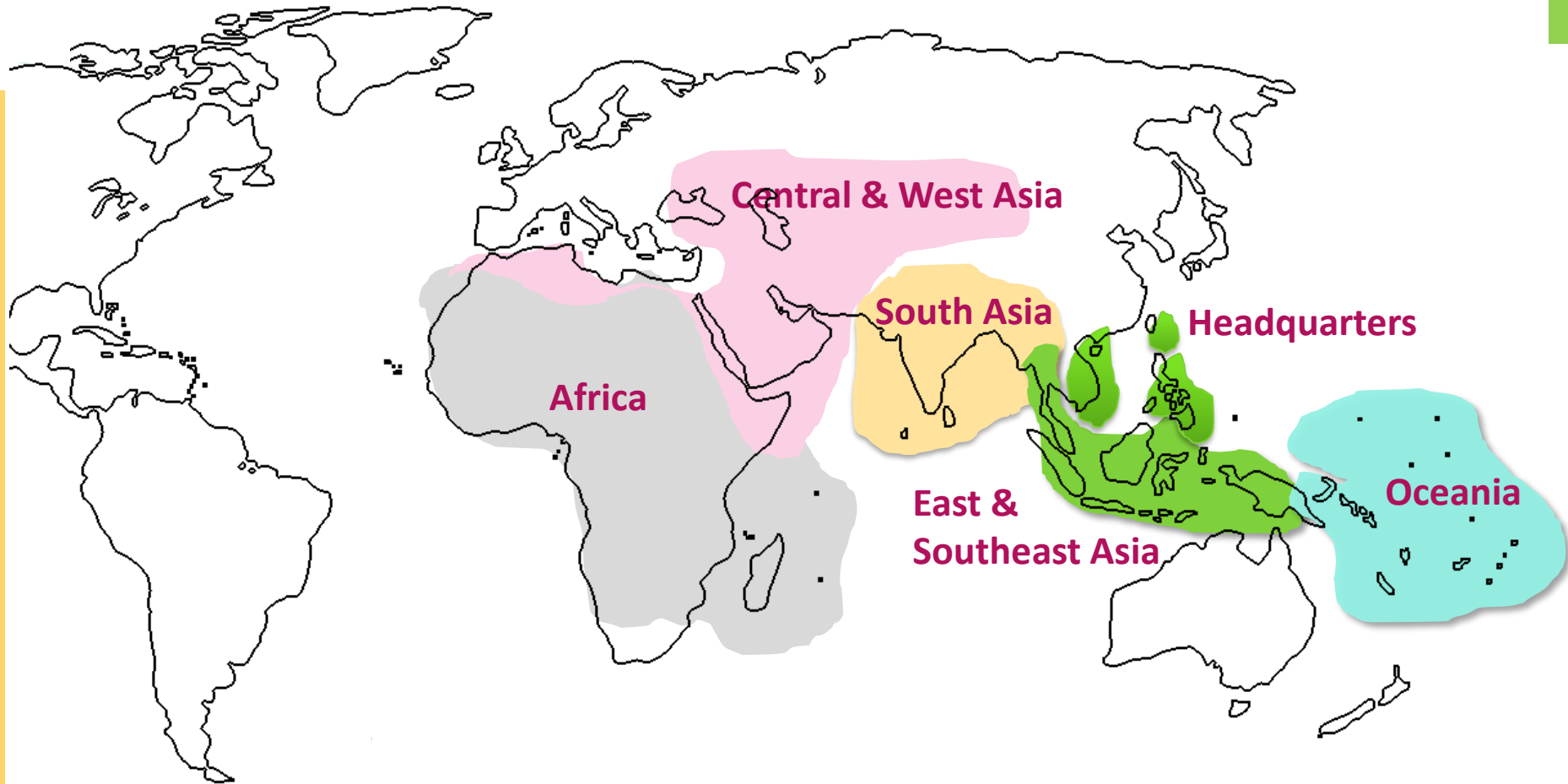


Research to promote development

- Founded in 1971 as the **Asian Vegetable Research and Development Center** with a regional research focus on Asia
- Our research and development is **nonprofit**
- Our research outputs are **global public goods**
- The **World Vegetable Center** has an expanding global role with a growing network of regional offices

*Alleviate poverty and malnutrition in the developing world through the increased **production and consumption** of health-promoting vegetables.*





WORLD Vegetable Center



AIRCA: An independent consortium

Association of International Research and Development Centers for Agriculture

- World Vegetable Center
- CABI
- Tropical Agriculture Research and Higher Education Center (CATIE)
- Crops for the Future (CFF)
- International Center for Biosaline Agriculture (ICBA)
- International Center for Integrated Mountain Development (ICIMOD)
- Africa Insect Science for Food and Health (*icipe*)
- International Network for Bamboo and Rattan (INBAR)
- IFDC





Our crop portfolio



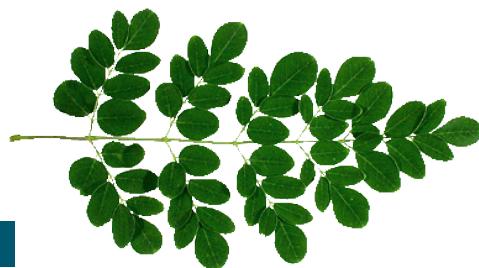
➔ Solanaceae:

- Tomato
- Pepper
- Eggplant



➔ Bulb Alliums:

- Onion
- Garlic
- Shallot



➔ Legumes:

- Mungbean
- Vegetable soybean



➔ Crucifers:

- Pak Choi
- Broccoli



➔ Cucurbits:

- Cucumber
- Pumpkin



➔ Traditional vegetables



Research and Development: Four global themes

Germplasm

Germplasm conservation, evaluation and gene discovery

Breeding

Genetic enhancement, varietal development, selection of indigenous lines, seed production

Production

Safe and sustainable vegetable production systems

Consumption

Postharvest management and market opportunities; nutritional security, diet diversification and human health





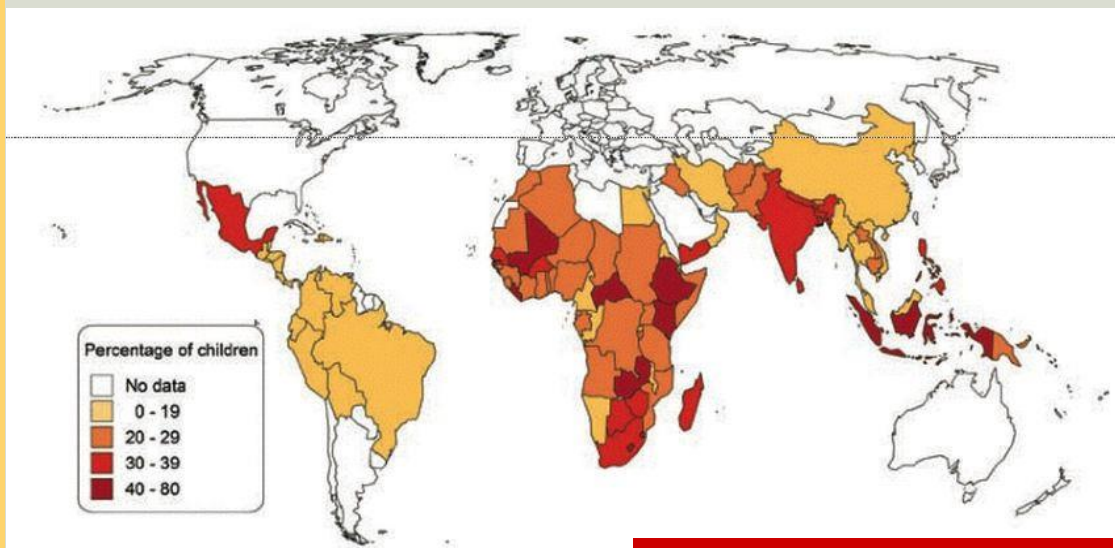
“Hidden Hunger”: Micronutrient deficiencies

Each Year

Malnutrition causes nearly half (45%) of deaths in children under five: 3.1 million children each year.

Each Day

- 400 mothers die in childbirth due to iron deficiency
- 1400 children will go blind due to vitamin A deficiency



Vitamin A deficiency





High quality, nutritious: ‘Golden’ tomatoes

➔ “Golden tomatoes”

- High quality
- Nutritious
- Good marketability
- Resistance to multiple diseases

➔ **One single improved tomato can provide a person’s full daily vitamin A requirements**



Contain 3 to 6
times more
vitamin A
than standard
types



Insects and pesticides: Eggplant fruit and shoot borer

- Most severe pest of eggplant in Asia and East Africa today
- Heavy pesticide spraying (140 and more times during 6 month cropping period)
- **Integrated pest management (IPM)** reduces pesticide use





Field-tested technologies benefit small-scale farmers

Grafting: *Helps farmers overcome flooding and soil-borne diseases*



Simple rain shelters:
Protect high-value crops

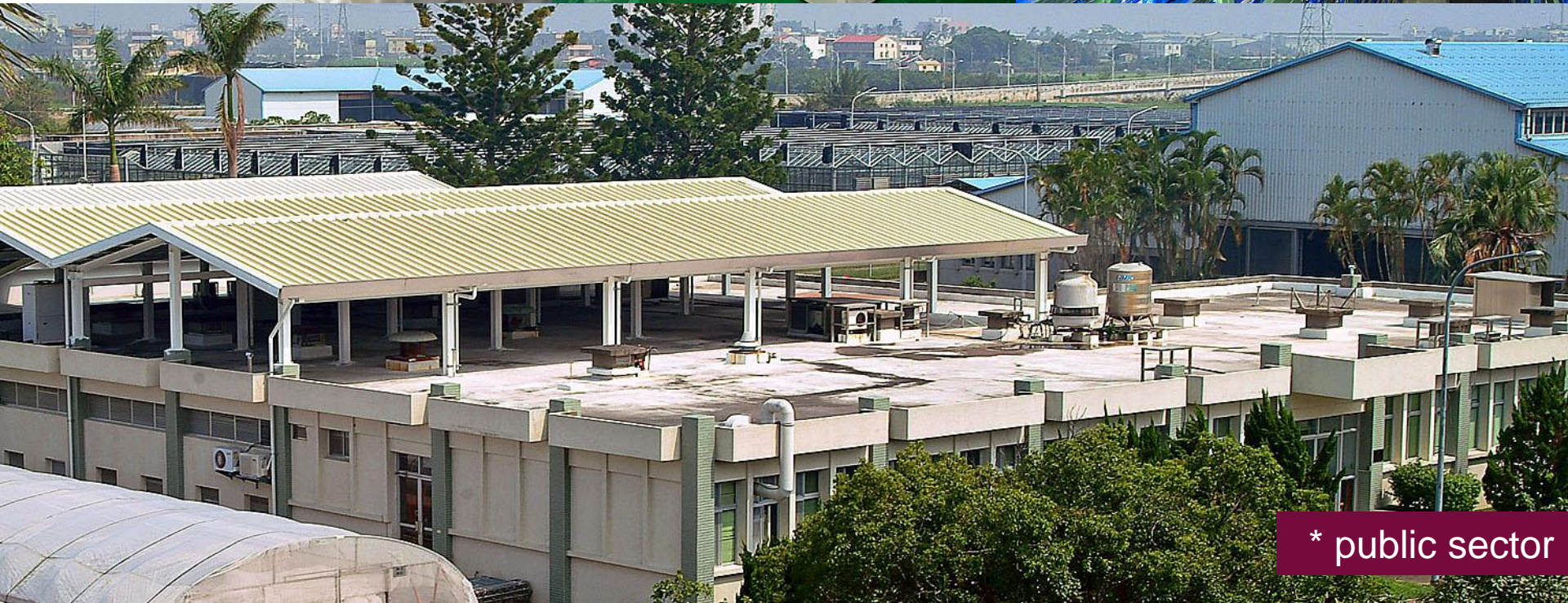




Vegetables: a path out of poverty

- Smallholders often have a comparative advantage in producing vegetables, since there are limited economies of scale
- Vegetable production leads to higher farm income and generates more jobs than other crops
- Vegetable value chains strengthen the rural economy





The world's largest* collection of vegetable germplasm:
AVRDC Genetic Resources and Seed Unit Genebank



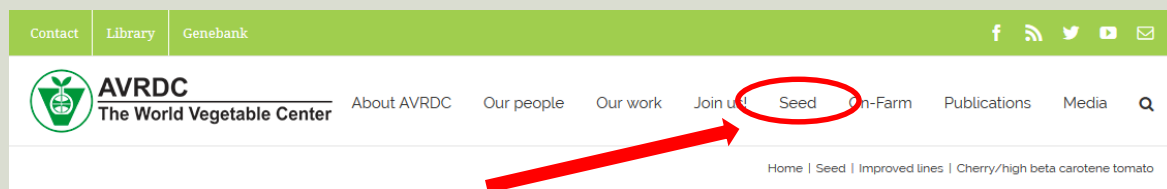
Germplasm accessions conserved – 8/2016

	Principal crops	Other crops	Total
No. of accessions	57,636	4,316	61,952
No. of genera			173
No. of species			442
Countries of origin			156





Order seed: avrdc.org



AVT00102
High beta carotene globe shaped fruit for fresh market. Early maturing, good heat tolerance, suited to hot-wet conditions.



AVT01174
Indeterminate line with Ty-1/Ty-3 TYLCD and TMV resistance. Small fruit size with oblong shape and orange color.



AVT01349
Indeterminate line with Ty-1/Ty-3 TYLCD and TMV resistance. Small fruit size with oblong fruit shape and red color.



AVT01350
Indeterminate line with Ty-1/Ty-3 TYLCD and TMV resistance. Small fruit size with oblong fruit shape and red color.

COMPARE PERFORMANCE

- Table of Characteristics

MORE INFORMATION ON EACH LINE

- AVT00102 (CLN2366B)
- AVT01174 (CLN3284A)
- AVT01349 (CLN3284J)
- AVT01350 (CLN3284G-1)

DATA SHEETS IN EXCEL

- Test location & crop management
- Plant characteristics & reactions to biotic stresses
- Yield & yield components

ALL CROPS

Best widely adapted selections for commercial release:

- Chili pepper
- Sweet pepper

For breeding purposes or commercial release with further local testing:

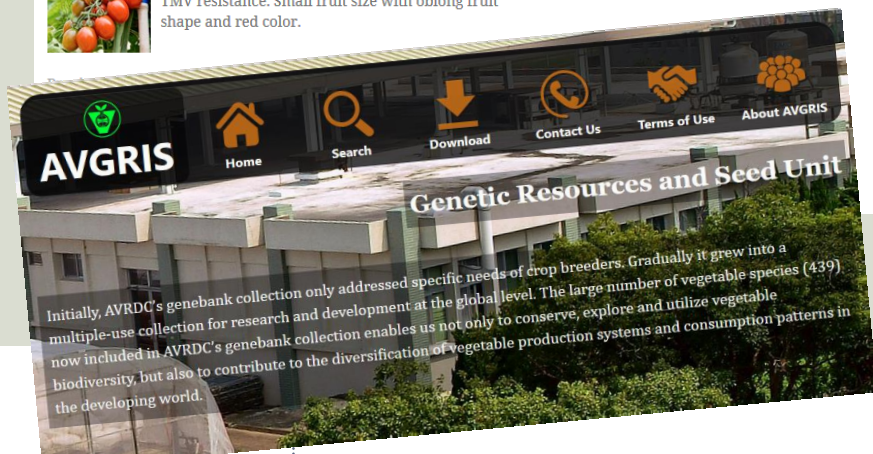
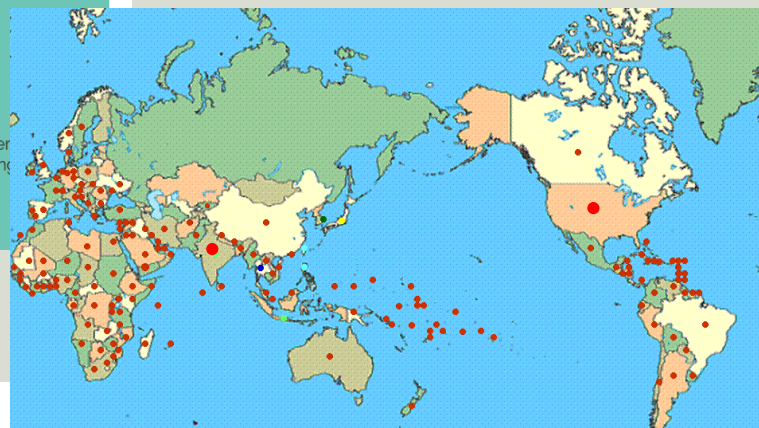
- Fresh market tomato
- Processing/dual purpose tomato
- Cherry tomato and high beta carotene tomato
- Vegetable soybean
- Grain soybean
- Leafy brassicas
- Chinese cabbage
- Shallot
- Bitter melon
- Onion
- Cucumber
- Winter squash

International nurseries sets for local testing

- Chili pepper
- Sweet pepper



Where does the seed go?





Improving tolerance to environmental stress



High yielding tomato variety



Wild tomatoes - source of drought tolerance





Food security: 15 crops...or 2,000 crops?!

The Nutritional Treasure of Indigenous Vegetables

Basella rubra (Malabar spinach)
Sauropus androgynus (Common sauropus)
Pomoea batatas (Sweet potato leaves)
Anredera cordifolia (Madrera vine)
Moringa oleifera (Drumstick tree)
Angelica keiskei (Ashitaba)
Solanum scabrum (African nightshade)
Polygonum odoratum (Vietnamese coriander)
Abelmoschus esculentus (Okra)
Corchorus olitorius (Jute mallow)
Oenanthe javanica (Water dropwort)
Limnophila rugosa (Big-leaved marshweed)
Zanthoxylum armatum (Japanese prickly ash)
Toona sinensis (Chinese cedar)
Coccinia grandis (Ivy gourd)
Adansonia digitata (Baobab)
Asystasia gangetica (Tropical violet)
Vigna unguiculata (Vegetable cowpea)
Lycium chinense (Chinese boxthorn)
Telasma cordata (Night-fragrant flower)

• Indigenous vegetables are highly nutritious and easy to grow
 • They are an important part of the diets of poor families in Africa and Asia
 • They can provide up to 50% of daily beta Carotene (pro-vitamin A) requirements and nearly 30% of iron
 • AVRDC has a collection of over 10,000 accessions of indigenous vegetables
 • We are identifying superior varieties and improving seed supplies and marketing

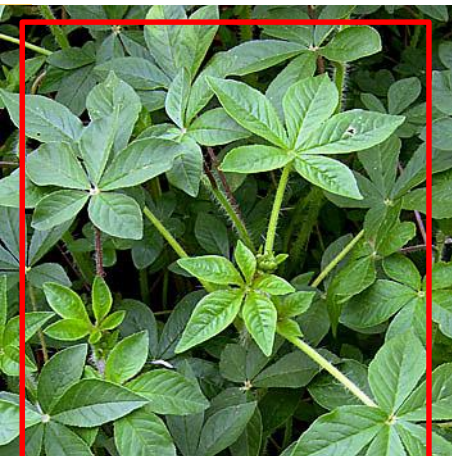
Nutrient value /100 g edible part	
β-carotene	> 3.5 mg
Folic acid	> 70 µg
Iron	> 3 mg
Protein	> 3 g
Calcium	> 200 mg
Vitamin C	> 100 mg
Vitamin E	> 3 mg
Anti-oxidant activity (Methanol extract)	> 4000 µmole Trolox

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 Web: www.avrdc.org





Traditional treasures: diet diversity



Spider plant

**African
eggplant**



Nightshade

Cowpea



Amaranth



Ethiopian kale





Traditional vegetables: Rich in nutrients

Micronutrient content of common and traditional vegetables



	Ranges	Cabbage	Moringa	Amaranth	Aibika	Sweet potato leaf
β -Carotene,mg	0.0 - 22	0.00	15.28	9.23	5.11	6.82
Vit C, mg	1.1 - 353	22	459	113	82	81
Vit E, mg	0.0 - 71	0.05	25.25	3.44	4.51	4.69
Iron, mg	0.2 – 26	0.30	10.09	5.54	1.40	1.88
Folates, μ g	2.8 – 175	ND	93	78	177	39
Antioxidant activity, TE	0.6 - 82,000	496	2858	394	560	870

Source: AVRDC Nutrition Lab



Building capacity for resilience



Capacity Building and Networking



35th IVTC INTERNATIONAL VEGETABLE TRAINING COURSE
From Seed to Table and Beyond
 5 September to 25 November 2016

In partnership with:



IVTC is endorsed by the International Society for Horticultural Science (ISHS) and Horticulture Innovation Lab Regional Center at Kasetsart University.



Dr. Sonsiri Sangchote leading the participants in the seed health sessions.



Evaluating lettuce plants at the Agri-Technology Complex.



Learning how to graft vegetable seedlings.



Accomplished grafters show their handiwork.

East and Southeast Asia															South Asia					Africa										Others																		
Brunei	Cambodia	China (PR)	Hongkong	Indonesia	Korea	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Taiwan	Timor Leste	Thailand	Vietnam	Bangladesh	Bhutan	India	Nepal	Pakistan	Sri Lanka	Burkina Faso	Cameroon	Gambia	Kenya	Malawi	Zambia	South Africa	Nigeria	Sudan	Swaziland	Afghanistan	Kazakhstan	Jordan	Lebanon	Iraq	Egypt	Papua NG	Tuvalu	Nauru	Palau	Rep of Kiribati	Sao Tome	Solomon Islands	Netherlands	UK	Venezuela	Male	Female
1		2	6	1						1		3	4		1		2		4	5	1				1			1		1			2		2	4	1	1	1	1	1	1	1	1	1	31	9	
2	75	139	7	59	18	60	11	71	23	7	4	3	59	102	47	18	10	9	8	34	3	1	1	1	1	1	1	2	1	3	24	20	4	1	2	2	4	1	1	1	1	1	1	1	1	585	269	
640															126					15										66															69%		31%	



Healthy diets begin with knowledge



Nature's delights

Recipes from
*Discovering Indigenous Treasures:
Promising indigenous vegetables from
around the world*

by Li-ju Lin, Yun-yin Hsiao and C. George Kuo





Healthy Home Garden Kits

- For farmers, trainees, or any private individual and to public and private agencies upon request
- Each kit includes seed of high yielding & nutritious vegetables
- Enough seed (2-50 g) of each crop to plant a home garden and sustain a healthy diet for a family of 4 for a year



Block A		Block B		Block C		Block D		Block E	
6m	Bitter melon July-October	1m	Bitter melon July-December	1m	Bitter melon July-October	1m	Chili July-June	1m	Chili July-February
	Onion October-March		Kelut methi January-March		Garlic November-March		Chili July-June		Chili March-June
	Amoranthus April-June		Bitter melon April-June		Spice gourd April-June		Okra July-October		Okra July-September
	Kangkong July-September		Tomato July-December		Amoranthus July-September		Tomato November-March		Tomato October-January
	Spinach October-February		Letting January-February		French bean September-January		Carrot February-March		Carrot July-November
Tomato March-June		Bitter melon March-June		Okra February-June		Mint February-March		Radish December-February	
1m		1m		1m		1m		1m	

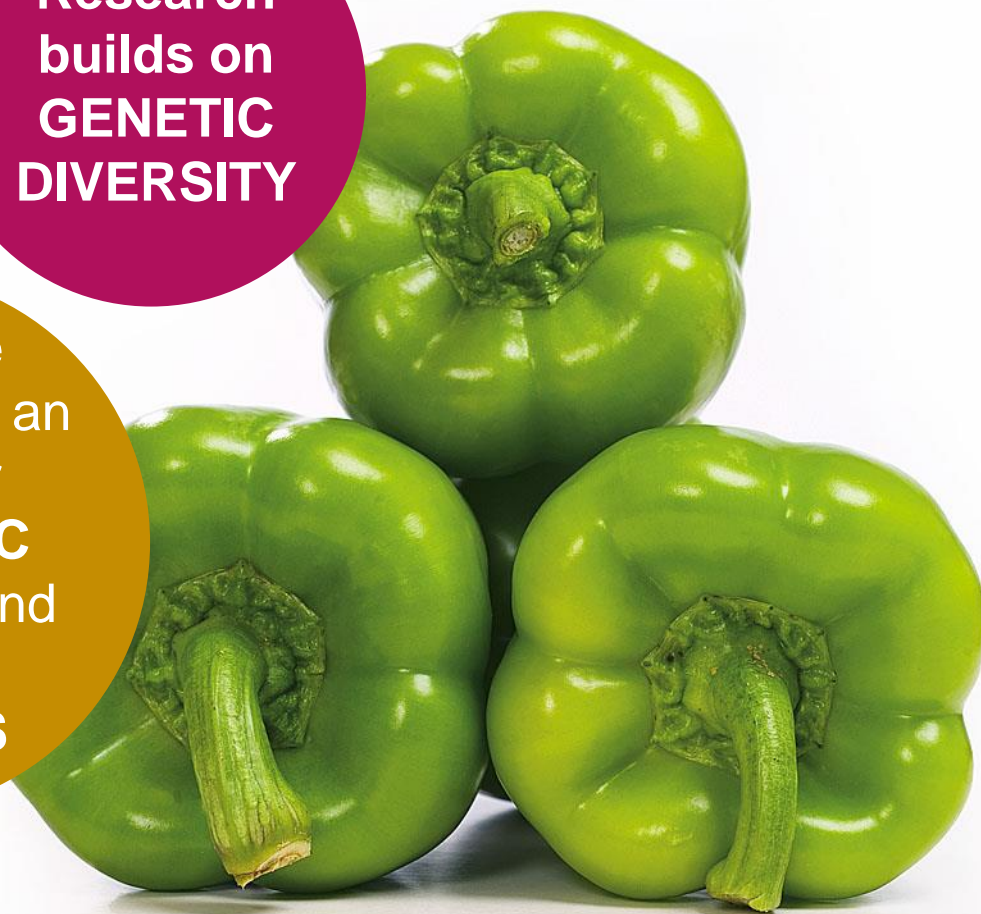


Key points

Vegetables
are
essential
for **HEALTH**

Research
builds on
**GENETIC
DIVERSITY**

Vegetable
production is an
engine for
**ECONOMIC
GROWTH** and
**HIGHER
INCOMES**



Thank you!



World Vegetable Center

