Tomato Value Chain

S.Shanmugasundaram

New World Record Holder for Hottest Chili Pepper
Trinidad Moruga Scorpion
Avg SHU = 1,207,764
Highest SHU = 2,009,231
Lowest SHU = 580,198

Bhut Jolokia (Ghost Pepper)
Avg SHU = 1,019,687
Highest SHU = 1,578,548
Lowest SHU = 279,315

Naga Morich
Not tested
Reported SHU 1,500,000

Trinidad Douglah (Chocolate 7-pot)
Avg SHU = 1,169,058
Highest SHU = 1,853,936
Lowest SHU = 923,889

Trinidad Scorpion
Avg SHU = 1,029,271
Highest SHU = 1,392,452
Lowest SHU = 801,180

Trinidad 7-Pot
Avg SHU = 1,066,882
Highest SHU = 1,291,800
Lowest SHU = 727,680


Trinidad Butch SCORPION PEPPER

www.ILoveItSpicy.com's

Scoville Unit Chile Pepper Scale

SCOVILLE HEAT UNITS	TYPES OF PEPPERS
15,000,000 - 16,000,000	Pure Capsaician
2,000,000-5,300,000	U.S. Grade Pepper Spray
580,198-2,009,231 *	Moruga Scorpion
923,889-1,853,936 *	Chocolate 7-Pot
279,315-1,578,548 *	Bhut Jolokia
801,180-1,392,452 *	Trinidad Scorpion
727,680-1,291,800 *	7-Pot
876,000 - 970,000	Dorset Naga
350,000 - 577,000	Red Savina
100,000 - 350,000	Scotch Bonnet & Habanero
50,000 - 100,000	Thai Pepper & Chiltepin
30,000-50,000	Cayenne & Tabasco
15,000-30,000	Arbol
12,000-30,000	Manzano
8,000-23,000	Serrano
3,500-8,000	Jalapeño
2,500-4,000	Guajillo
1,000-2,000	Poblano
500-2,000	Anaheim
500-750	Red Chile
0	Sweet Bells

* Results taken from the New Mexico Pepper Institute study announced February 6, 2012 in Las Cruces, New Mexico.

The Origin

- Early Aztecs 700 AD South American Andes
- Introduced to Europe in 16th Century
- Portuguese introduced to India in 1494
- Introduced to Asia in 1700
- British thought that the fruit is beautiful but it was poisonous!
- Fruit or Vegetable? No tax to tax!!
- Pizza Margarite- Red, White and Green!

- **Scientific classification**
- Kingdom: Plantae
- (unranked): Angiosperms
- (unranked): Eudicots
- (unranked): Asterids
- Order: Solanales
- Family: Solanaceae[1]
- Genus: *Solanum*[1]
- Species: ***S. lycopersicum***
- **Binomial name**
    - ***Solanum lycopersicum***[1][2]
- L.
- **Synonyms**
- *Lycopersicon lycopersicum* (L.) H. Karst.
- *Lycopersicon esculentu*

Botany

- **Nightshade family- Solanaceae**
- ***Solanum lycopersicum***
- **Usually a perennial, cultivation annual**
- **Weak stem, hairy, 1 to 3 meters tall (3-10 ft)**

Related Species

- ***Solanum cheesmaniae***
- ***S. galapagense***
- ***S. pimpinellifolium***
- ***S. chmielewski***
- ***S. habrochaites***
- ***S. neorickii***
- ***S. pennelii***

Related Species

- *S. arcanum*
- *S. chilense*
- *S. corneliomulleris*
- *S. huaylasense*
- *S. peruvianum*

Tomato production in metric tons

- 1 Spain 33,911,702
- 2 People's Republic of China 13,718,171
- 3 India10,965,355
- 4 United States 10,313,000
- 5 Egypt 9,204,097
- 6 Turkey 5,976,912
- 7 Iran 4,826,396
- 8 Italy 3,922,500

- 9 Brazil 3,867,655
- 10 Mexico 2,936,773
- 11 Russia 1,938,710
- 12 Uzbekistan 1,930,000
- 13 Nigeria 1,701,000
- 14 Ukraine 1,492,100
- 15 Greece 1,338,600
- 16 Morocco 1,312,310

- 17 Chile 1,270,000
- 18 Tunisia 1,170,000
- 19 Syria 1,163,300
- 20 Portugal 1,147,600
- 21 Iraq 830,000
- 22 Romania 814,376
- 23 Algeria 800,000
- 24 Canada 770,059
- 25 Japan 750,300
- 26 Netherlands 720,000
- 27 France 714,635
- 28 Poland 702,546
-

- 29 Argentina 680,000
- 30 Indonesia 624,420
- 31 Jordan 600,336
- 32 Cuba 575,900
- 33 Kenya 559,680
- 34 Kazakhstan 549,310
- 35 Pakistan 536,217
- 36 Colombia 490,929
- 37 Saudi Arabia 477,572
- 38 Azerbaijan 438,419
- 39 Sudan 432,000

- 40 South Africa 420,701
- 41 Israel 420,524
- 42 Cameroon 420,000
- 43 South Korea 408,170
- 44 Guatemala 355,434
- 45 Turkmenistan 310,000
- 46 Lebanon 305,300
- 47 Australia 296,035
- 48 Armenia 293,784
- 49 Belarus 274,139
- 50 Thailand 270,000

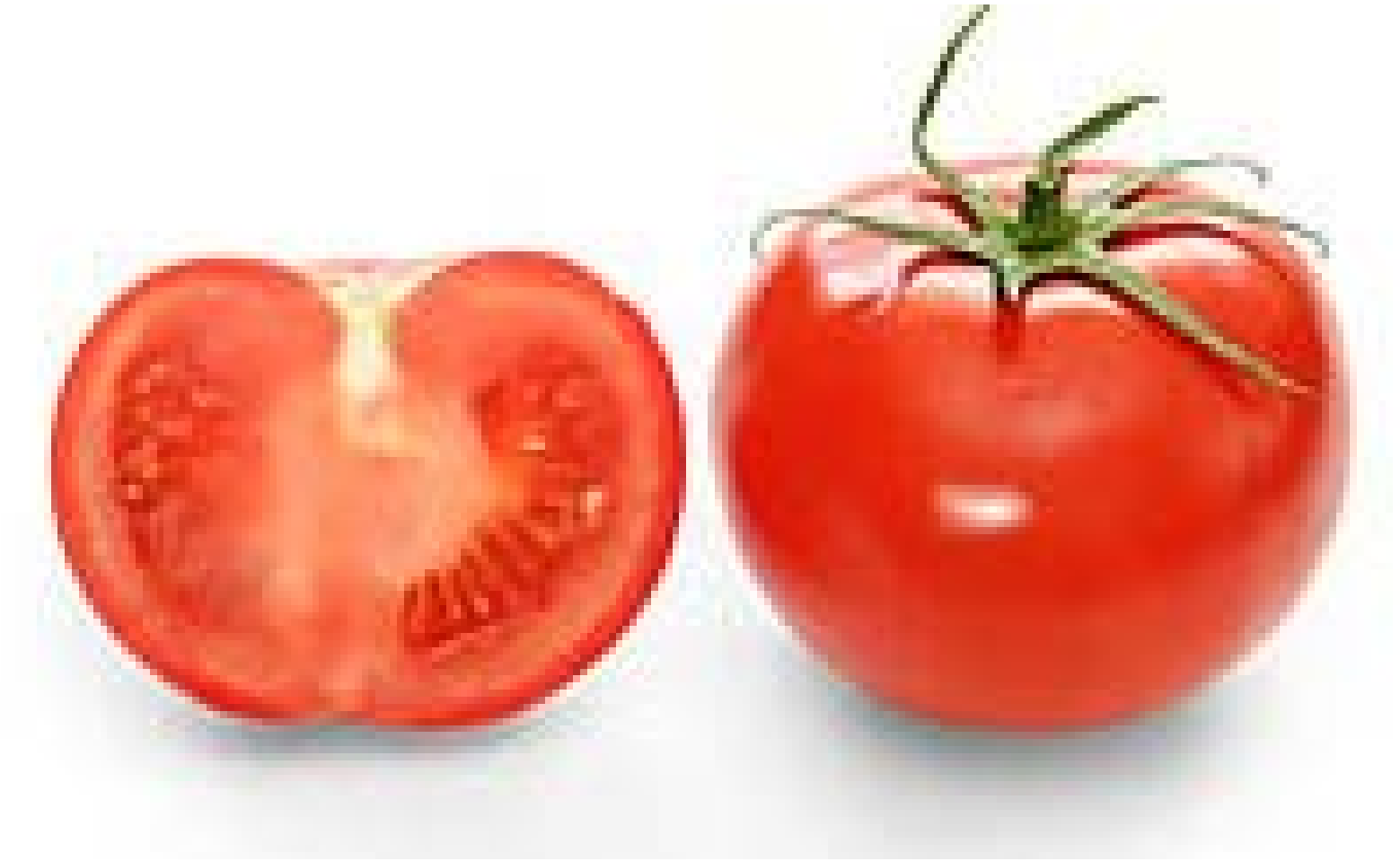
Tomato seedling

27 Days after Planting

Tomato Flower

Flowers and Young Fruits

A cross section of ripe fruit



AVRDC Germplasm Bank
(30 SEP. 2015)

Crop	No. of acc
Globally important crops:	
Soybean	**15,478**
Pepper	**8,263**
Tomato	**8,261**
Mungbean	**6,758**
Eggplant	**3,721**
Brassica	**1,938**
Allium	**1,129**
Subtotal	**45,548**

AVRDC Germplasm Bank (30 Sept. 2015) – cont'd

Crop	No. of acc
Regional and Indigenous crops:	
Vigna angularis	2,376
Vigna unguiculata	1,613
Cucurbita	1,116
Abelmoschus	1,063
Luffa	871
Vigna mungo	854
Amaranthus	795
Phaseolus bean	688
Cucumis	644
Momordica	462
Lablab bean	438
Hibiscus	379
Vigna umbellata	370
Others	4,289
Subtotal	**15,958**
Total:	**61,506**

NUTRITIONAL VALUE

(Tomato and vegetable juice, low sodium)

https://www.ars.usda.gov/SP2UserFiles/Place/80400525/Data/SR/SR28/reports/sr28fg11.pdf

- Nutritional value per 100 g (3.5 oz)
- Energy 91KJ (22 Kcal)
- Carbohydrate 4.59g
- Sugars 3.28g
- Dietary fibre 0.8g
- Fat 0.1g
- Protein 0.6g

Vitamins

- **Vitamin A equiv** **78µg**
- **Beta-carotene** **830µg**
- **Lutein zeaxanthin** **80µg**
- Thiamine (B_1) 0.04mg
- Niacin(B_3) 0.73mg
- Vitamin B_6 0.14mg
- **Vitamin C** **27.7mg**
- Vitamin E 0.32mg
- **Vitamin K** **5.3µg**
- **Folate** **21µg**

Trace Elements and others

- Magnesium 11mg
- Manganese -
- Phosphorous 17mg
- Potassium 193mg

- Water 93.5g
- **Lycopene (Antioxidant)** 9660**µg**

FRUIT DIVERSITY

Roma tomato

Cracking in tomato

Cherry or Grape tomato

Diversity in tomato


NEED
acute
BREED
vegetables

Heirloom Tomato

Heirloom Tomato

Grape tomato

CONSTRAINTS TO PRODUCTION

BACTERIAL WILT SYMPTOMS

Devastation by Tomato bacerial wilt

VASCULAR DISCOLORATION OF THE STEM DUE TO BACTERIAL WILT

TEST FOR BACTERIAL WILT
BACTERIA OOZES FROM CUT STEM IN WATER

CULTURING THE BACTERIA


CLEAN STEM
BW INFECTED STEM

EARLY BLIGHT SYMPTOMS ON THE FRUIT(*ALTERNARIA SOLANI)*

LATE BLIGHT
PHYTOPHTHORA INFESTANS

GRAFTING TO OVERCOME BW OF TOMATO

- SEE REF:
- Black, L.L., D.L. Wu, J.F. Wang, T. Kalb, D. Abbass, and J.H. Chen. 2003. Grafting tomatoes for production in the hot-wet season. AVRDC Publication No. 03-551.

Bacterial wilt control by grafting

Tomato Fruit worm

Heliothis armigera

RESEARCH

Highlights - Tomato

COA funds for tomato

1996-2004

NT$5.5 million (US$170,000)

No. of Tomato Varieties Released in Taiwan since 1996

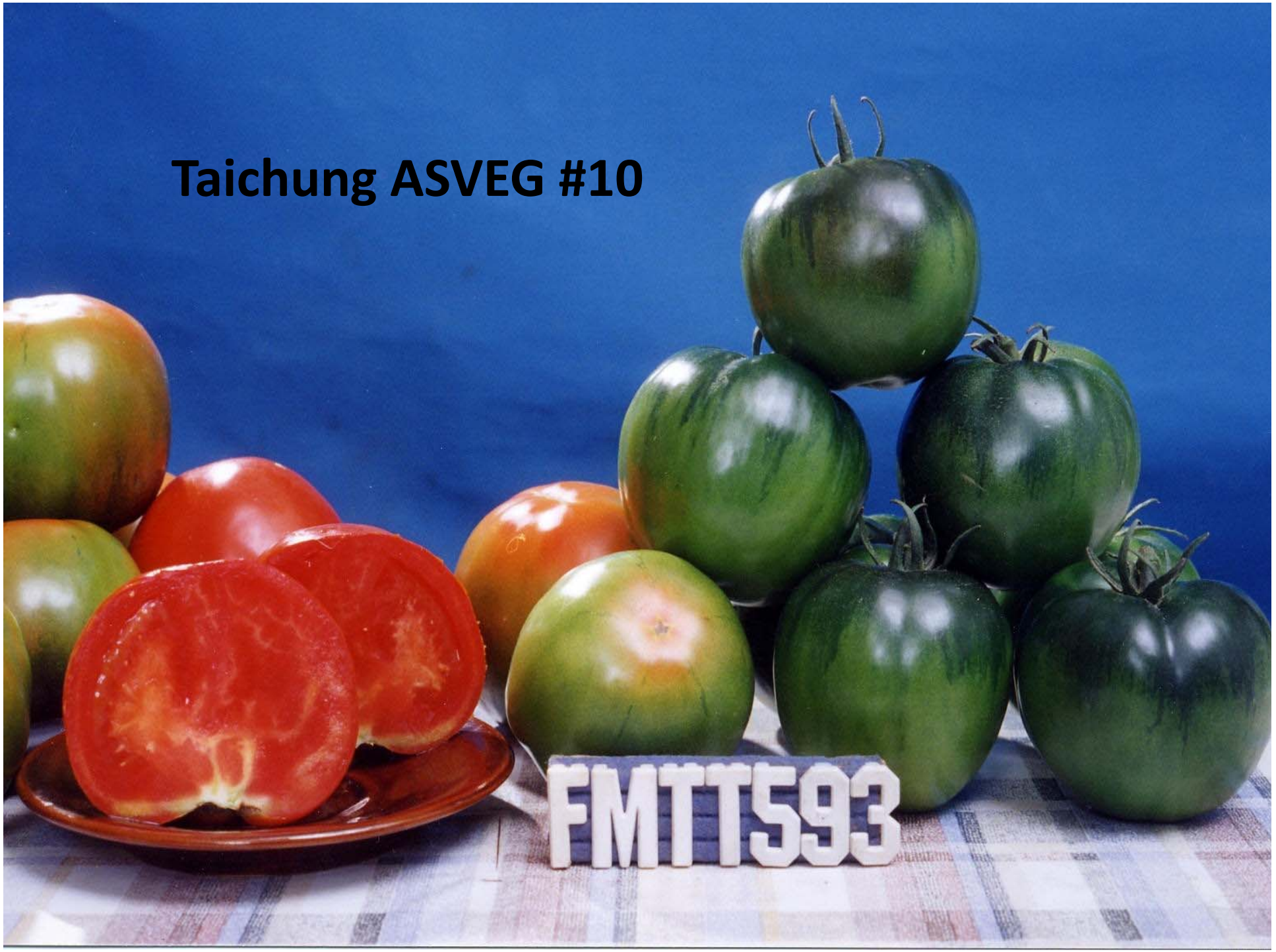
Tainan DAIS	**Cherry tomato**	**2 (Tainan ASVEG 6, 11)**
Taichung DAIS	**Fresh market**	**1 (Taichung ASVEG 10)**
Taoyuan DAIS	**Fresh market**	**1 (Taoyuan-ASVEG 9)**
Hualien DAIS	**Fresh market**	**1 (Hualien ASVEG 5)**
	High β cherry	**1 (13)**
	Cherry	**1 (14)**

New Fresh Market Tomato for Taiwan

R to ToLCV, ToMV, BW,FW
Large fruit (142 g)

ToLCV Sus. CK

Fresh market tomato

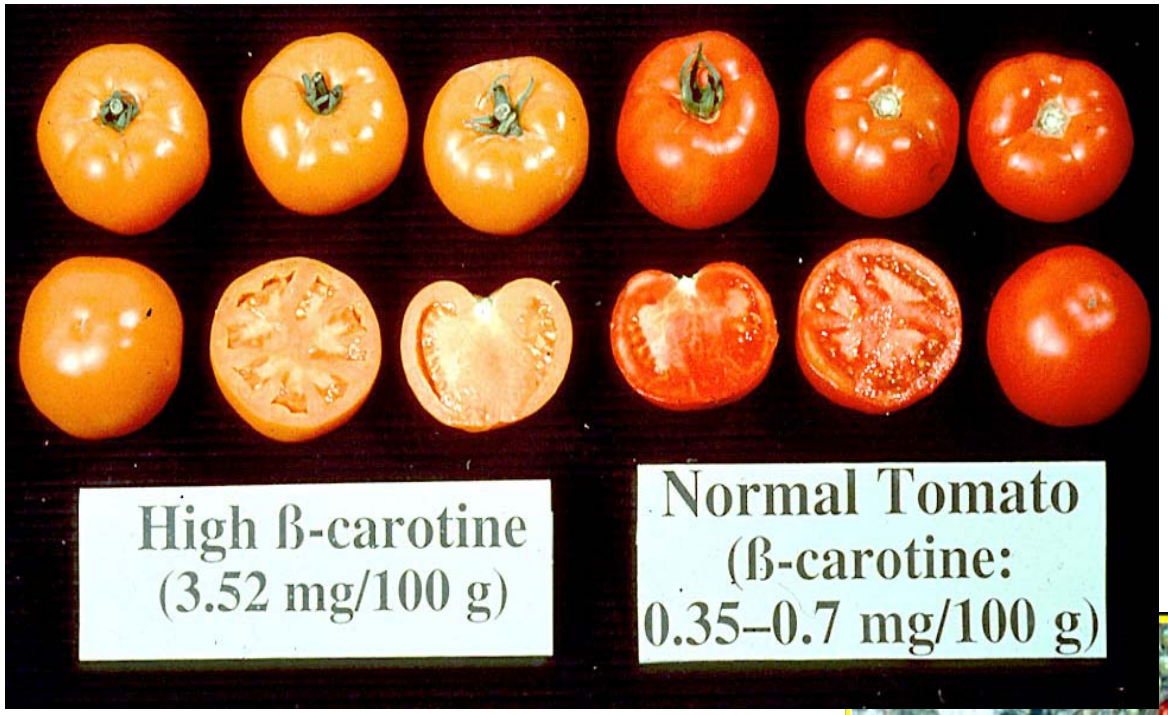

Taichung ASVEG #10
FMTT593


CHT 264

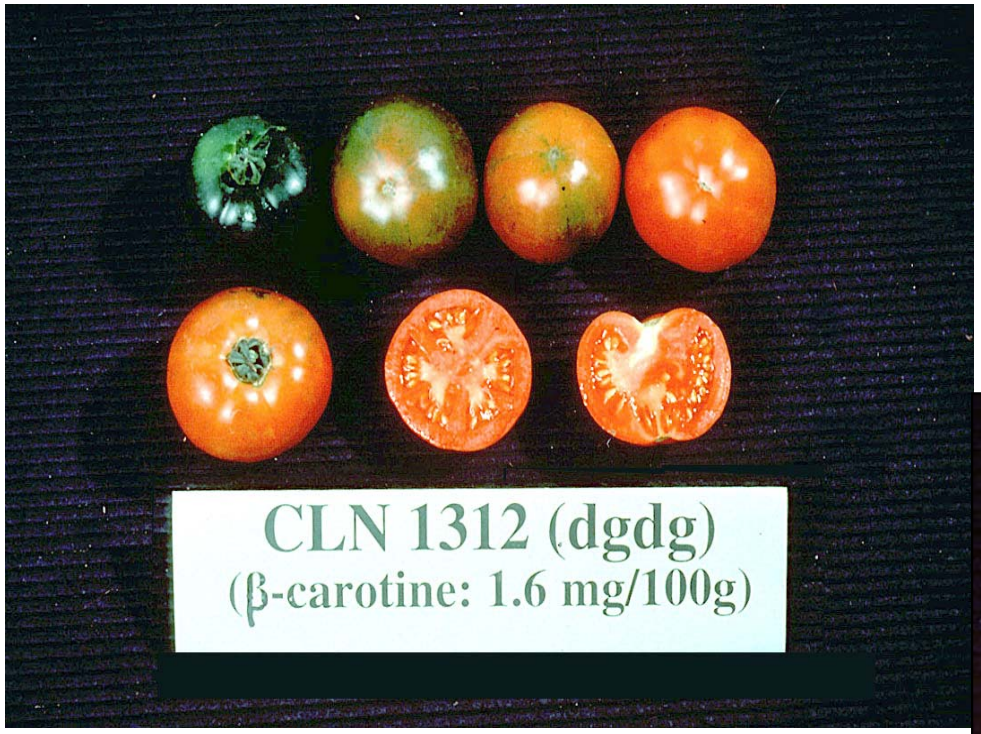

CLN-1314BC1F3-57A-30-26-0
[Brix°: 4.3; β-carotine: 7.37 mg]

Hualien ASVEG #14

Hualien ASVEG #13


High ß-carotine
(3.52 mg/100 g)
Normal Tomato
(ß-carotine:
0.35–0.7 mg/100 g)


CHT 264



High β-Carotene
and
high Lycopene

Impact - Tomato

AVRDC varieties area:	**9,400 ha**
Total value:	**US$394 million**
AVRDC tomato 2004	**2,000 ha**
Total value:	**US$84 million**

RATE OF RETURN ON INVESTMENT

- FOR **EVERY DOLLAR** INVESTED IN RESEARCH BY THE TAIWAN COUNCIL OF AGRICULTURAL RESEARCH (COA) THE ESTIMATED RATE OF **RETURN IS ROUGHLY $500**

NON-CIRCULATING HYDROPONICS

- SOIL-LESS CULTURE
- SPACE IS LIMITED
- FREQUENT WATERING NOT NEEDED
- LESS CARE
- ADAPTED TO HOME, SCHOOLS, NURSING HOMES, URBAN SETTINGS
- CAN BE USED IN SUPER-MARKETS

Tomato Planter™

PUT THE PLANTER AT THE BOTTOM WITH SOIL IN THE BAG.

POUR THE WATER THROUGH THE HOLE

Price & Wastage Flow

Source: S. Raghunath and D. Ashok, June 2004 (IIM- Bangalore)

Source :(5) From competition at home to competing abroad :World Bank

H: Markups increase with risk assumed by the channel player ?

Or Is this risk/reward structure "desirable"?

PROCESSING

Tomato Harvester

Harvesting Tomatoes

Tomato Harvester in Action

Tomato Arrives factory

Processing in the Factory

Care of Sundried Tomato

Sundried Tomato

Greenhouse Tomatoes

Creative Product Diversification

Tomato Value Added products

Tomato Value Added Products

Marghareta Pizza

Tomato Soup with vegetables

Tomato Puree and Peeled Tomato

Baked Tomato with vegetables

Tomato Meatballs

FUTURE

- **“Yesterday is history**
- **Today is Present**
- **Future is Mystery”**
- **“Biological Globalisation”**
- **The present is destroying the past – Barthlott, 1999**