

Tomato Value Chain

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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 [India 10,965,355](#)
- 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
<u>Globally important crops:</u>	
Soybean	15,478
Pepper	8,263
Tomato	8,261
Mungbean	6,758
Eggplant	3,721
<i>Brassica</i>	1,938
<i>Allium</i>	1,129
Subtotal	45,548

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

Crop	No. of acc
<u>Regional and Indigenous crops:</u>	
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 (B₁) 0.04mg
- Niacin(B₃) 0.73mg
- Vitamin B₆ 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) 9660µg**

FRUIT DIVERSITY

Roma tomato



Cracking in tomato



Cherry or Grape tomato



Diversity in tomato







Heirloom Tomato



Heirloom Tomato



Grape tomato









CONSTRAINTS TO PRODUCTION

BACTERIAL WILT SYMPTOMS



Devastation by Tomato bacterial wilt





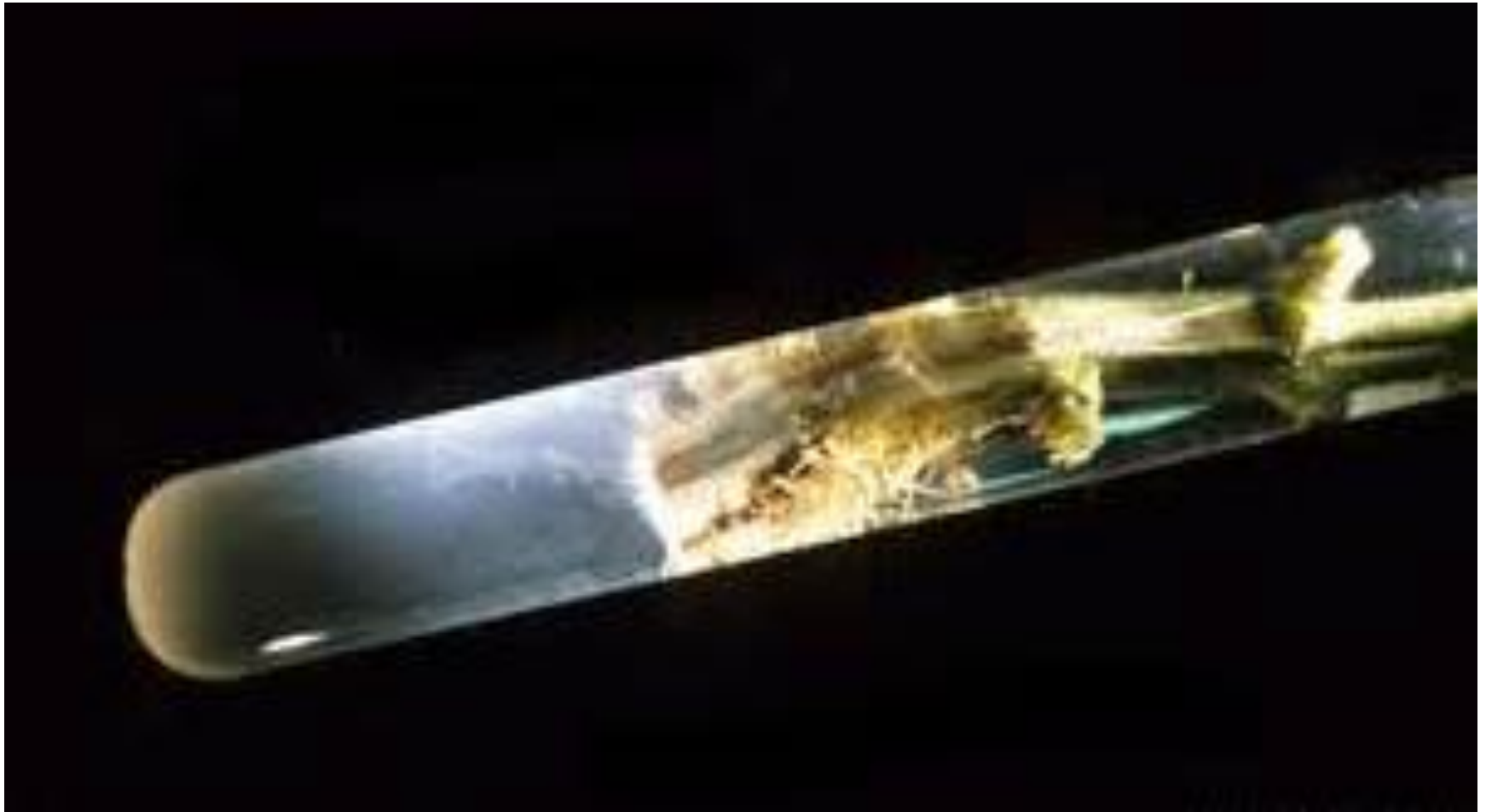
VASCULAR DISCOLORATION OF THE STEM DUE TO BACTERIAL WILT



TEST FOR BACTERIAL WILT BACTERIA OOZES FROM CUT STEM IN WATER



CULTURING THE BACTERIA



The image shows two vertical plant stems against a blue background. The stem on the left is green and smooth, while the stem on the right is green but has a large, irregular, brownish lesion on its upper half. The labels 'CLEAN STEM' and 'BW INFECTED STEM' are placed below each respective stem.

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)



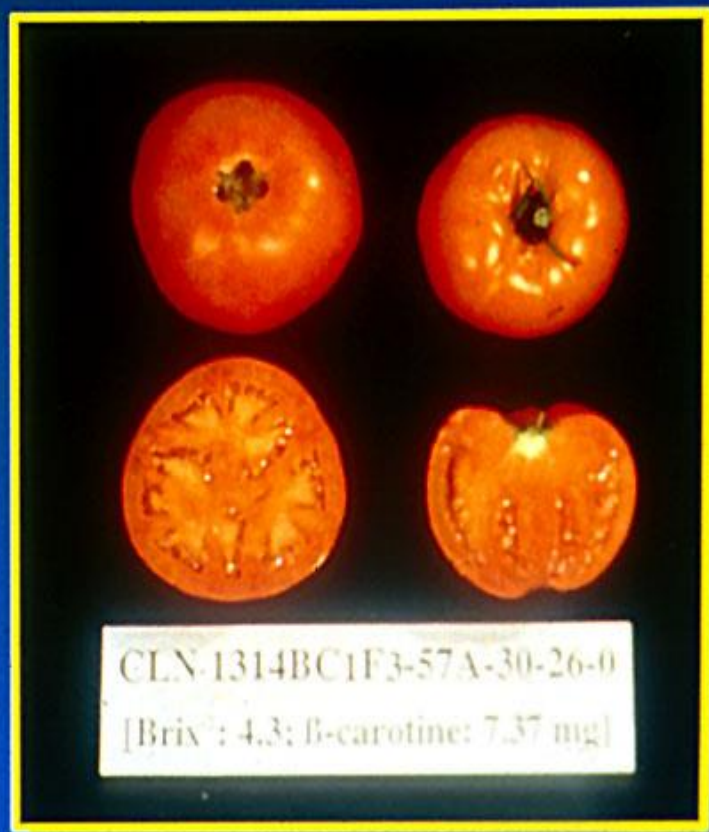
ToLCV Sus. CK

Fresh market tomato



Taichung ASVEG #10







Hualien ASVEG #14



Hualien ASVEG #13



High β -carotene
(3.52 mg/100 g)

Normal Tomato
(β -carotene:
0.35–0.7 mg/100 g)



CLN 1314BC IF3-57 A-30-26-0
[Brix : 4.3; β -carotene: 7.37 mg]



CLN 1312 (dgdg)
 (β -carotene: 1.6 mg/100g)

High β -Carotene
 and
 high Lycopene



CLN 1310BC1F3-45-23R(F8)
 [color(a/b):2.04; β -carotene:1.23 mg]

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
ON THE TOP



Price & Wastage Flow



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

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

Q: Is this risk-based structure “efficient”? Q

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**