VEGETABLE VALUE CHAIN MAPPING AND ANALYSIS: framework and case studies

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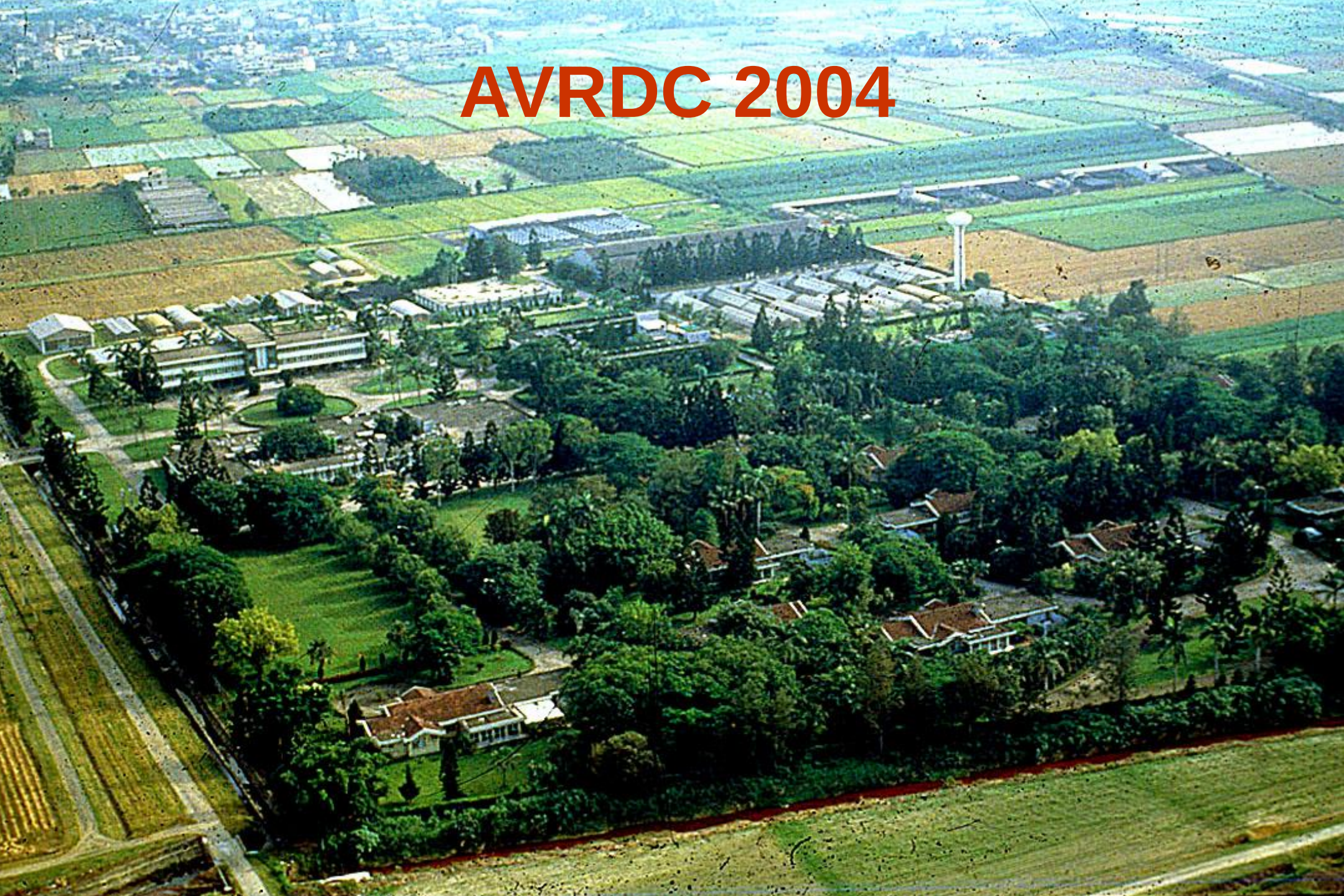
亞洲蔬菜研究發展中心
ASIAN VEGETABLE RESEARCH
AND DEVELOPMENT CENTER

AVRDC 1973


AVRDC 2004

The Future of Food

Eradicate World Hunger

How?

Note by Note (NbN) cooking of Chef Herve

Extracted from Vegetables and fruits

- Culinary Innovation (NbN)
- Molecular cuisine
- Deconstruction of Food

- Individual textures, flavors and compounds
- In the Form of Foams, Gels and others

- Nutrients and flavors to powders and liquids
- Shelf Stable

- Vegetables and fruits are mostly water
- Transport, spoilage, not environment friendly

Tastes and Smells

Allyl isothiocyanate from Mustard- Wasabi

1-Octen-3-ol-Wild Mushroom

Benzyl mercaptan-Garlic, Horse Radish, Mint, Coffee

Same compound different strengths taste like curry or maple syrup

Peachy- Hexyl acetate
Cucumberish- trans,cis-2,6-nonadien-1-ol

Cheap Whiskey taste by adding a few drops of vanillin!!

What is Coca Cola?
Sucrose, phosphoric acid and caramel color – Coca Cola!!

Changing Food Habit is Difficult.

Stupid Cow Story

- Retailer and Consumer-Quality bad/Price High
- Manufacturer- Tanneries Enjoy 15% Protective Tariff by Government
- Tanneries- Blame Mataderos and Slaughterhouses
- Slaughterhouses- Ranchers over brand cows affecting quality
- Ranches- It is the cows fault- They rub their hides against the barbed wire and scratch themselves to fend off flies that attack them- Stupid Cows!

- What is Value Chain?
- What is Supply Chain?
- What is Vegetable Soybean?
- The Farmer
- Vegetable Soybean in Cereal Cropping System
- Research on Vegetable Soybean

- Harvesting
- Processing
- Global Production
- Marketing
- Product Diversification?
- Seed Production
- Conclusion

- The case of Mungbean
- The case of Tomato
- The case of Moringa
- Green Leafy Vegetables

What is Value Chain?

Value Chain

In Google Search:

Value Chain had 14 million hits

ABI/ Informs Search-1673 documents

675 scholarly Journal papers

26 Ph.D. dissertations

-Feller et al., 2006

Value Chain

The key concept is :

Competitive Advantage

VALUE CHAIN

- The value chain is a business management concept that includes nine activities that work together to provide value to customers. When a company implements a value chain, it possesses a greater ability to generate profits.

  Created by Michael Porter (1979), 1985.

Machael Porter's Value Chain Analysis

PRIMARY ACTIVITIES

SUPPORT ACTIVITIES

Firm infrastructure
Human resources management
Technology development
Procurement

Figure 2 : Porter's Value Chain (Porter, 1985)

Value Chains

Five Primary Activities

- Inbound Logistics
- Operations
- Outbound Logistics
- Marketing and Sales
- Services

Value Chains

Four Support Activities

- Firm Infrastructure
- Human Resource Management
- Technology
- Procurement

The Value Chain for Vegetables – From Seed to Table

Vegetable Value Chain

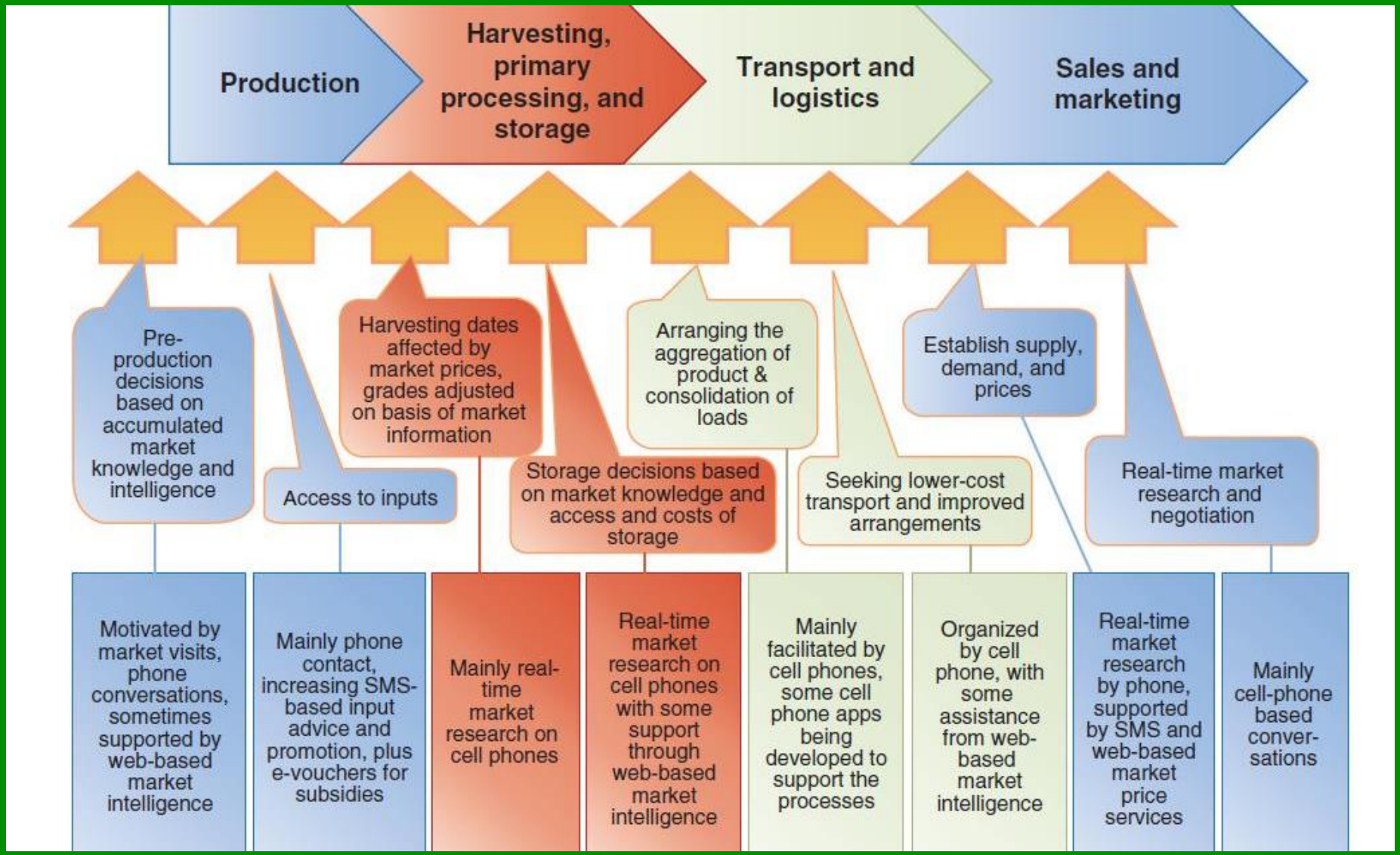
Definition

The Whole range of goods and services necessary for a vegetable or vegetable product to move from the farm to the final customer or consumer

Value Chain Steps

1. Identify sub-activity for each primary activity
2. Identify sub-activity for each support activity
3. Identify links
4. Look for opportunity to increase value
5. Business strategies
6. Prioritization

Inputs to Marketing along Vegetable Value Chain



- What is Value Chain?
- Value Chain vs Supply Chain
- What is Vegetable Soybean?
- Vegetable Soybean in Cereal Cropping System
- Research on Vegetable Soybean

Supply Chain (Definition)

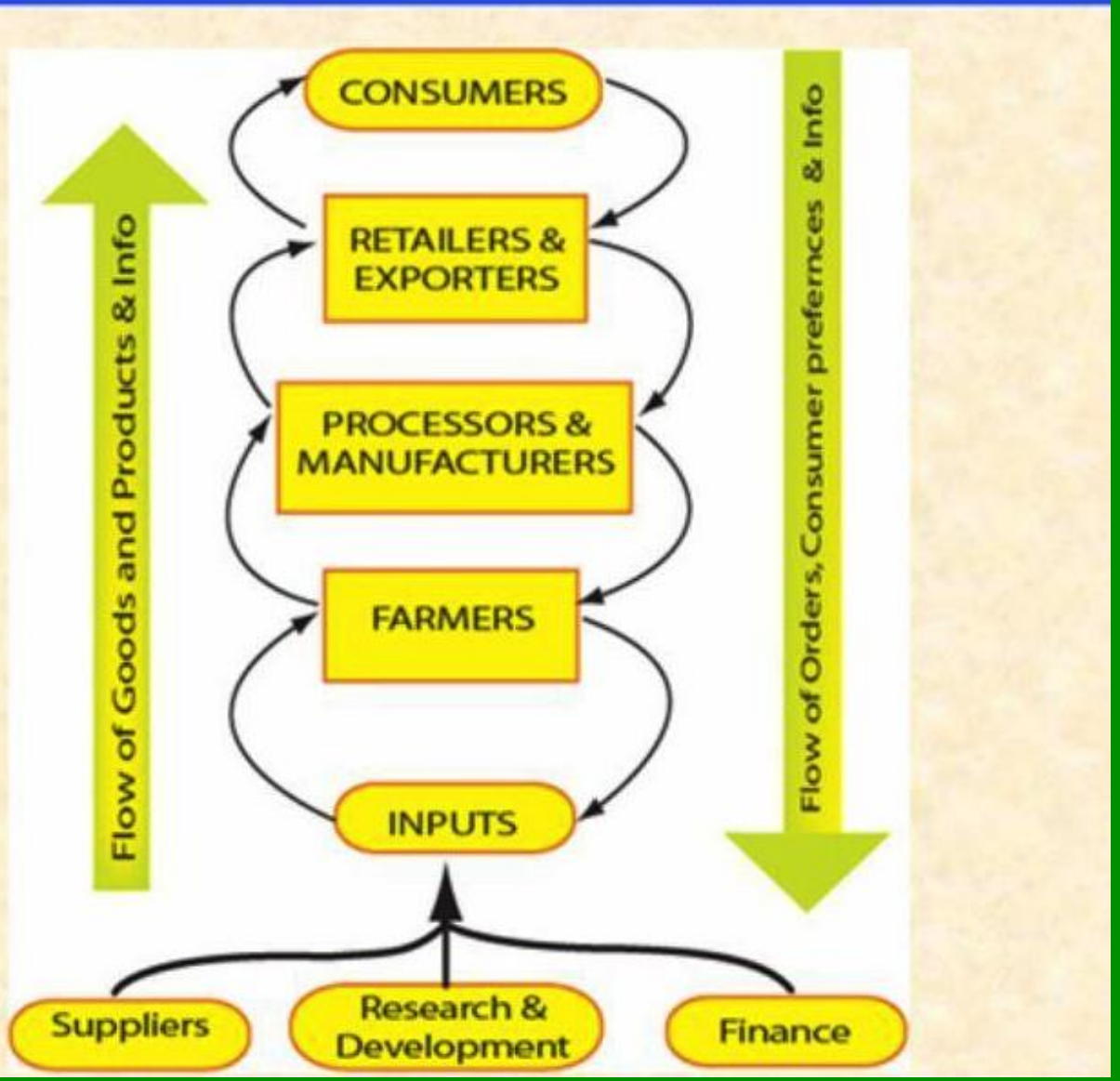
- The Integration of key business processes from end user through original suppliers that provides products, services and information that add value for customers and other stakeholders.

- _Global Supply Chain Forum 1998.

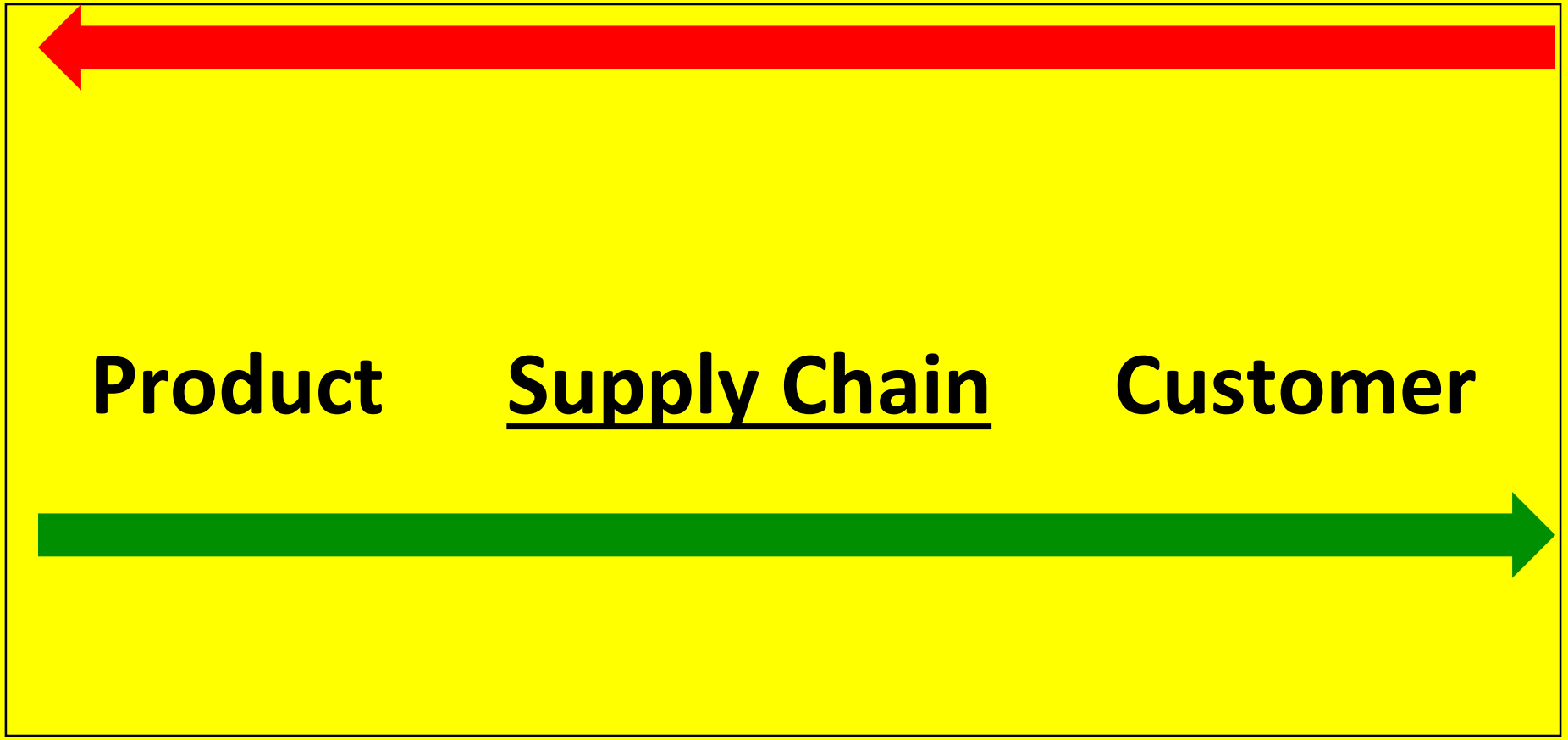
Supply Chain

- Focus Upstream- Integrate Supplier/Producer Processes
- Improve Efficiency
- Reduce Waste

THE VALUE CHAIN MODEL



Product Value Chain Customer



Product Supply Chain Customer

Value Chain

- Focus Downstream
- Creating Value in the Eyes of the Customer
- Operate in Both Directions-Suppliers Accrue Value
- Customers Derive Value Delivered from Products and Services

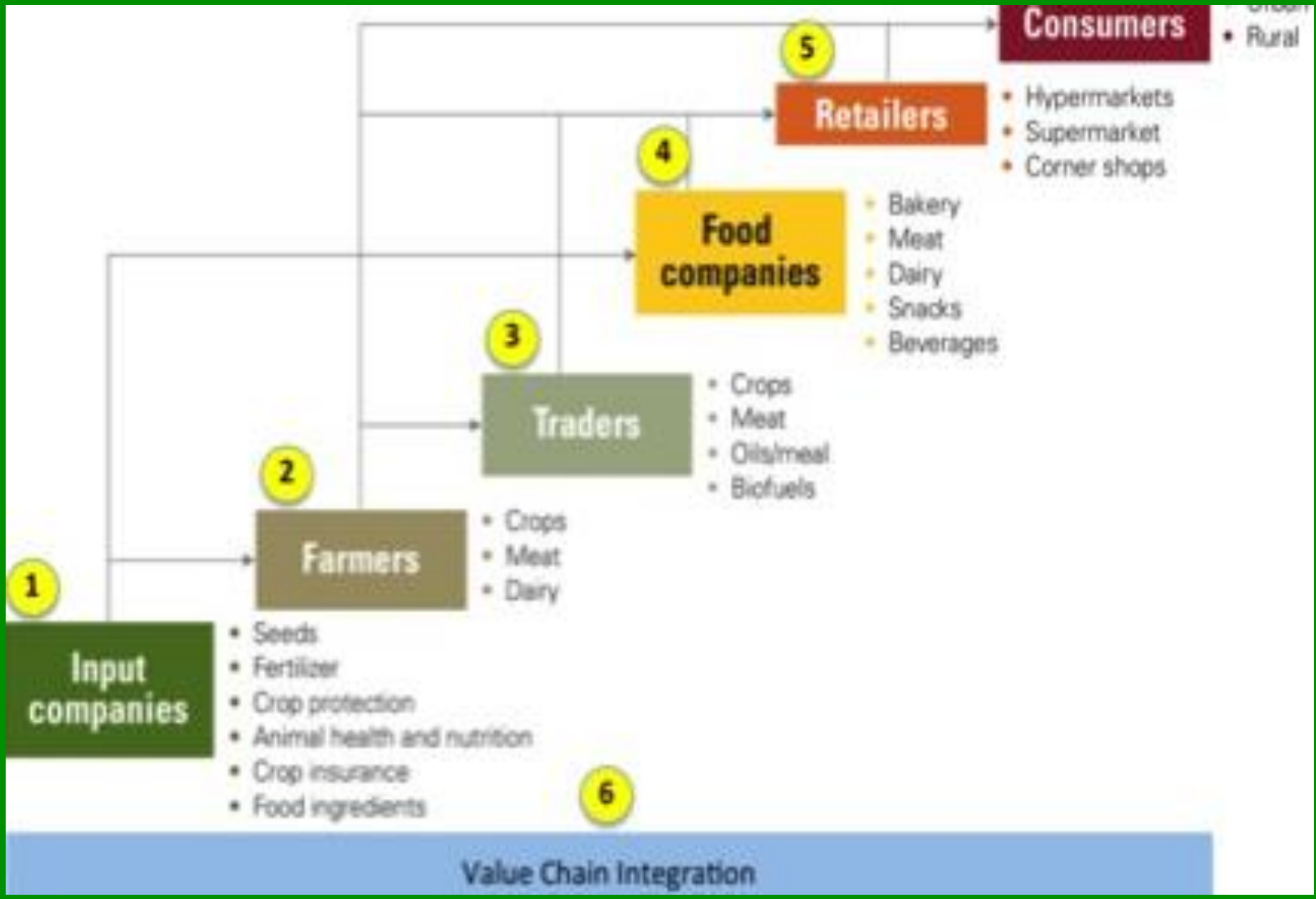
Profitable Value Chain

- Align What Customer Wants
- The Demand Chain and What is produced via Supply Chain
- Supply Chain-Reduce Costs, Operational Excellence
- Value Chain-Innovation in Product Development & Marketing

Value chain and Supply chain

- Demand
- Market price
- Supply
- Consumers willingness to pay
- Farmers incentive to produce
- Price farmer gets

The stages of Value chain for vegetables


Consumers
• Rural
5
Retailers
• Hypermarkets
• Supermarket
• Corner shops
4
Food companies
• Bakery
• Meat
• Dairy
• Snacks
• Beverages
3
Traders
• Crops
• Meat
• Oils/meal
• Biofuels
2
Farmers
• Crops
• Meat
• Dairy
1
Input companies
• Seeds
• Fertilizer
• Crop protection
• Animal health and nutrition
• Crop insurance
• Food ingredients
6
Value Chain Integration

Value chain functions and Actors

Value chain stages	Functions	Actors
Input supply	Seed/seedling	, Cooperatives, Research centers, Retailer shops, seed enterprise, Individuals
	Fertilizers	Cooperatives/Unions
	Agro-chemicals	Retailer shop

Cont…

Value chain stages	Functions	Actors
Input supply	Farm Equipments	Cooperatives, Retail shops, NGO, Private workshops, Agricultural mechanization, Micro enterprise
	Packing and transporting materials	Private workshops, Factories, Farmers
Production	Vegetable production	Farmers, Organized groups, Private
Post Harvest	Sorting/grading, processing	Whole sellers, collectors, farmers, User groups, Processing plant owners

Cont…

Value chain stages	Functions	Actors
Trading/Whole sale	Whole sale, Transport, Store	Investors, Middle men, farmers
Processing	Sorting/ Grading, Value addition/ juice house	Whole sellers, Collectors, Farmers, Organized groups, Investors,
Retail	Retailing	Open market retailers, local vendors, Supermarket, veg. retailers, farmers, Retailing shops
Consumers	End users of vegetables	Farmers, Universities, Hotels/cafeterias, Military centers, urban dwellers, Correction centers, Orphanage, hospitals

Service provided and Providers at each stage

Stage	Service provided	Service Providers
Input	Provision of Seed/ seedling	Cooperatives, NGO, research centers, seed enterprise, Organized farmers, Individual farmers
	Provision of Fertilizers	Cooperatives/ Unions
	Provision of Agrochemicals and spraying service	Retailing shop,, private
	Provision of Farm Equipment/ Irrigation technologies and maintenance service	Cooperatives, Retailing shops, NGO, Private workshops, Agricultural mechanization, Private workshops

Cont…

Stages	Service provided	Service providers
Production	Extension	, NGO
	Credit	, Cooperative, NGO
	Spraying service	Private shops, NGO
	Capacity building	Universities,, NGO, Cooperative promotion agency, private companies
Postharvest handling	Extension service	NGO, Universities, processers
	Business development	Trade and transport Bureau
Trading	Capacity building	Trade and transport Bureau

Cont…

Stages	Service provided	Service providers
Trading	Transport	Private transporter, Share companies
	Arrangement of market centers	Municipals, Government
processing	Technical advice	Trade and Transport, Quarantine regulatory department, policies from Govt.
retailing	Arrangement of marketing sites	Trade and transport bureau and municipals, Government

Vision Statement

To see improved income and livelihoods of male and female households by increasing production and productivity by 75 percent and improving the quality of vegetables.

Sub visions

Value chain stages	Vision/stage
Input provision	To see improved access of farmers with quality and quantity of improved technology timely and affordable cost
Production	To see increasing the production of vegetables crops with better income and diet provision.
Post harvest Handling	To reduce the post harvest loss to the minimum using proper extension of post harvest technologies
Marketing	Linking the production of fruit crops with marketing system for better income provision

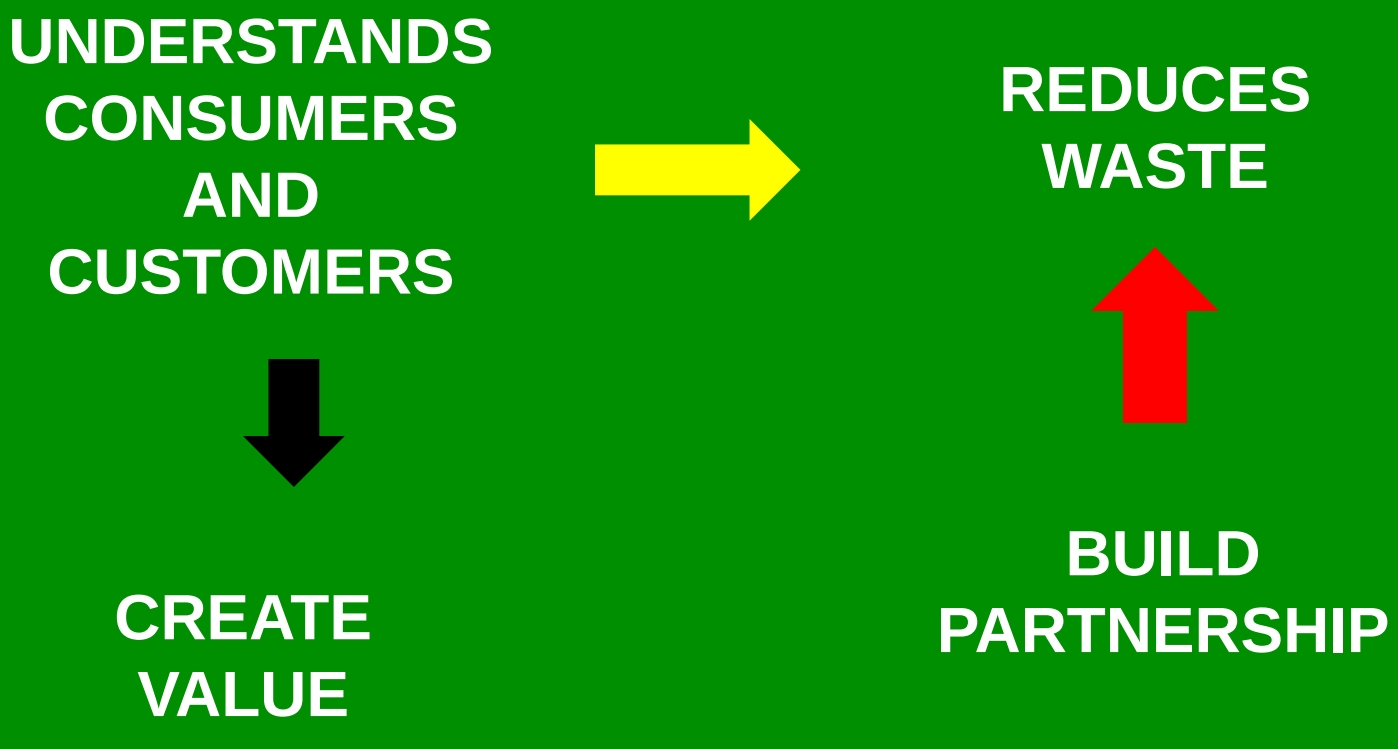
Constraints and oportunitiesa

Constrains	oportunities
Shortage of certifies seeds	The focus of the government towards Irrigated agriculture
Shortage of seedling	The presence of irrigation sheme
Poor extension service	The florishing of new universities
Week market linkage	The inception and focuses of research to irrigated agriculture /IAR/
Week provision of technologies - post harvest , water lifting technologies,	
Week administration of schemes	
Week irrigation research	
Poor agronomic practice/Irrig. water manag' t	
Poor watershed management	
Unwise utilization of agro chemicals	
Shortage of skill and capacity across	

Value Chain

- The full range of activities and services required to bring a product or service from conception to sale in its final form to local, national, regional and international markets.
- Value chain includes input suppliers, producers, processors, intermediaries, buyers and consumers.
- They are supported by technical, business and serivice providers ("Chain Analysis" 2009)

VALUE CHAIN ANALYSIS



VALUE CHAIN ANALYSIS

The process for understanding the systemic factors and conditions under which a value chain and its firms can achieve higher level of performance.

It is a tool in the process of achieving collaborative allocationand management of resources within and between businesses in a chain, the purpose of which is to improve the competitiveness as a whole

VALUE CHAIN ANALYSIS

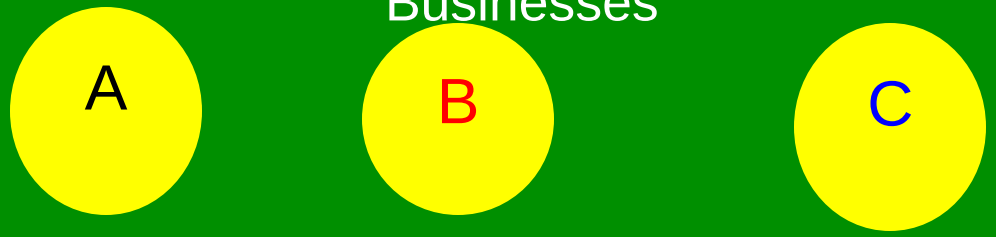
IDENTIFIES CONSUMER VALUE AND PAY FOR A PRODUCT OR SERVICE

-HOW WE DO THINGS?—”IMPROVE INPUTS”
-THE THINGS WE DO--- “NEW IMPROVED OUTPUTS”

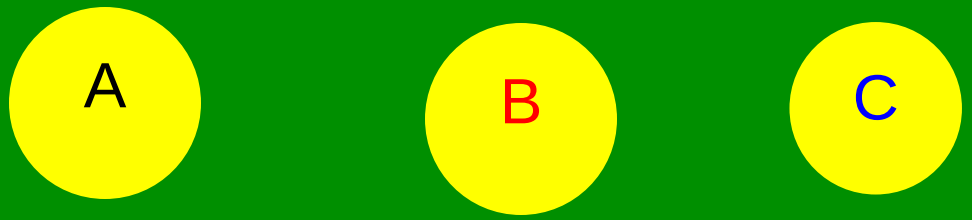
-DO THE RIGHT THINGS
-DO THINGS RIGHT

Businesses

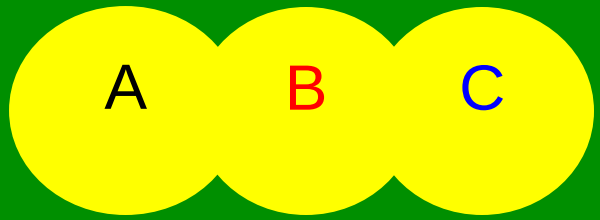
Fragmented Chain



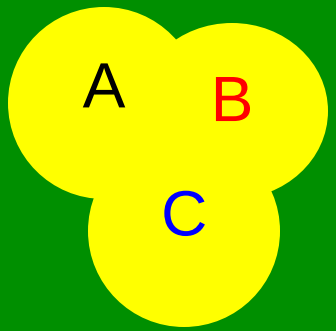
Cooperative Chain

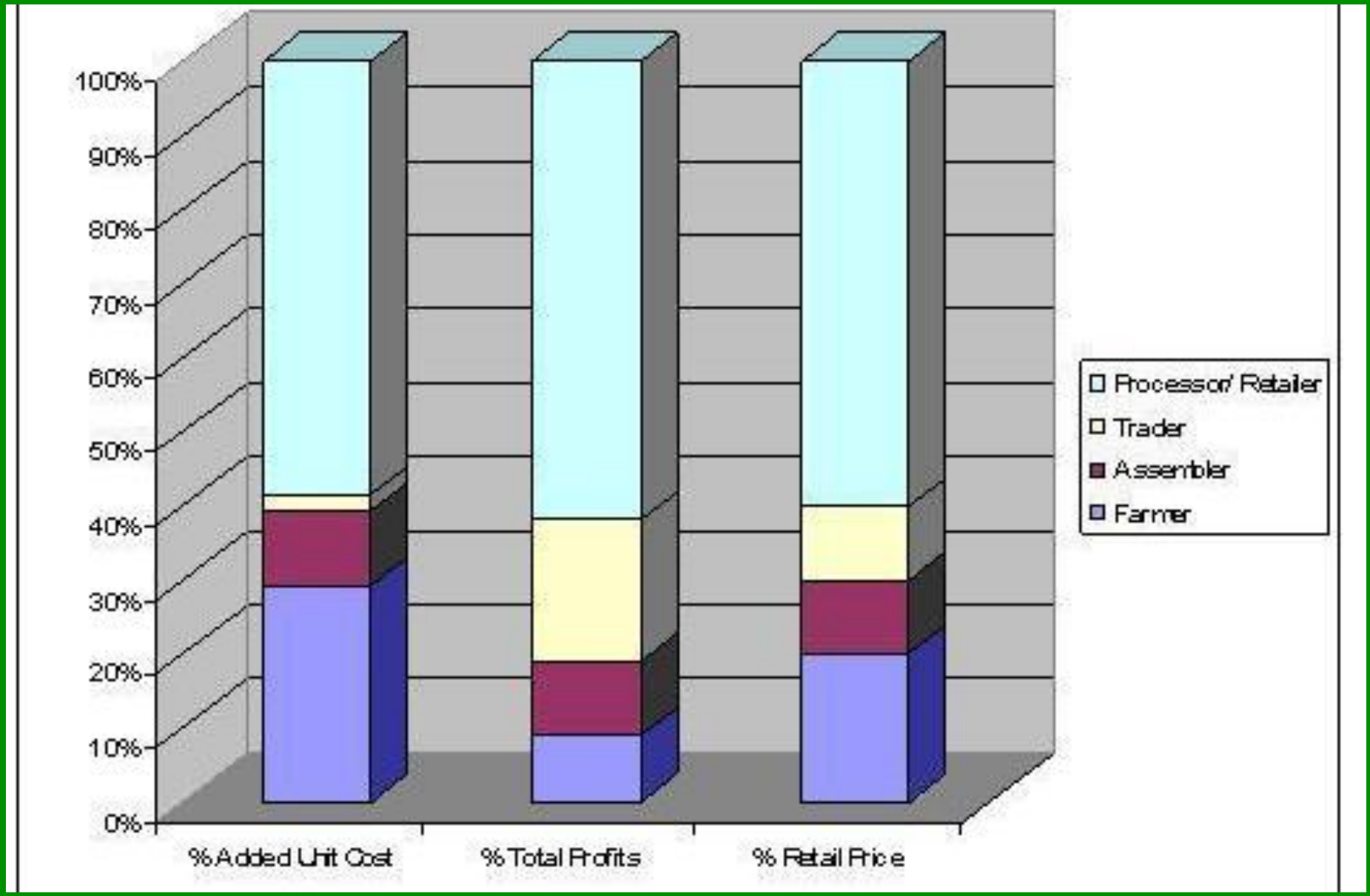


Coordinated Chain



Collaborative Chain

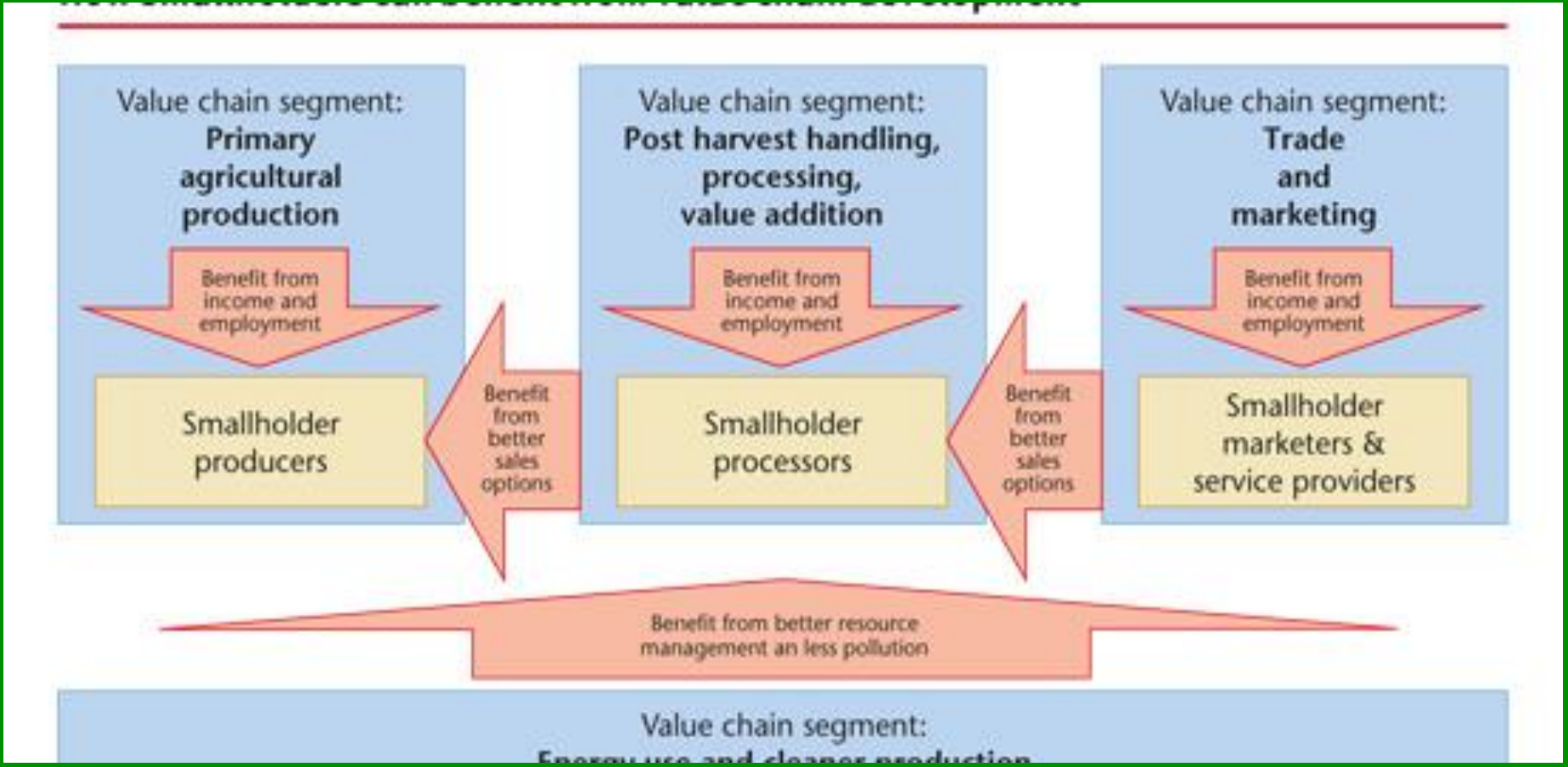



100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
% Added Unit Cost
% Total Profits
% Retail Price
Processor/ Retailer
Trader
Assembler
Farmer

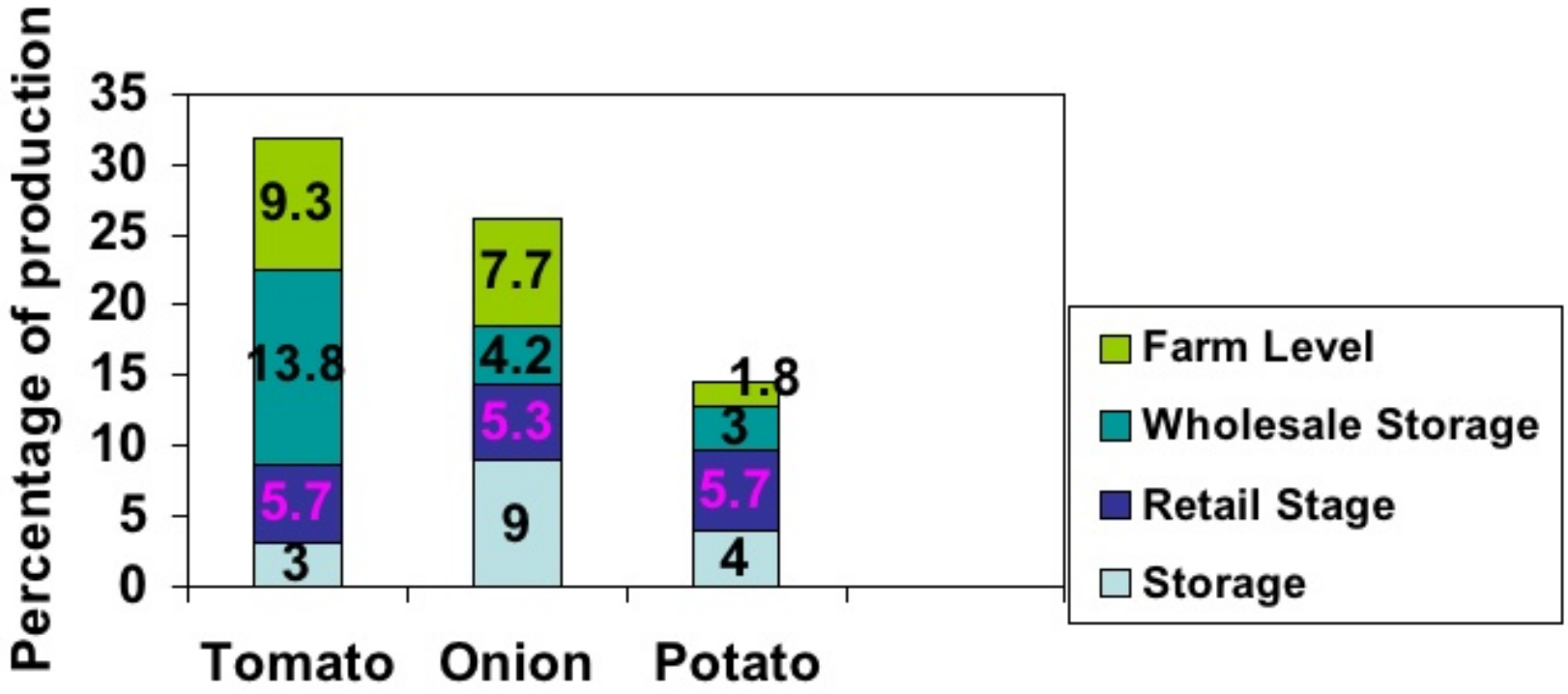
Calculation of marketing margins - example of presenting a calculation of value chain margins

Chain Actor	Costs				Profits		Margins
	Unit Total Cost	Added Unit Cost	% Added Cost	Unit Price	Unit Profit	% Total Profits	Unit Margin	% Retail Price
Farmer	20,000	20,000	29%	25,000	5,000	9%	25,000	20%
Assembler	32,100	7,100	10%	37,500	5,400	10%	12,500	10%
Trader	39,185	1,685	2%	50,000	10,815	19%	12,500	10%
Processor /	89,873	39,873	58%	125,000	35,127	62%	75,000	60%
Total		68,658	100%		56,342	100%	125,000	100%

Small hoders and Value Chain



Post-harvest losses of major vegetables in India



Source: "Vegetable Demand and Production in India: Long-term Perspective" from Praduman kumar, Pramod Kumar and Surabhi Mittal, Indian Agricultural Research Institute, New Delhi.

Post harvest losses of Vegetables in India
(Percent of Production)

- Tomato------ 31.8
- Onion-------- 26.2
- Cucurbits----- 20.8
- Root vegs----- 13.8
- Others------- 21.7
- Average all vegs19.5
- If no storge in Africa losses reach 45% or more.


Tempeh, Indonesia
Fermented with mold, *Rhizopus sp*


Miso
soup

Vegetable soybean

Yield: 10 tons /hectare within 65days in the tropics

What is Vegetable Soybean?
Family: Leguminosae
Sub-family: Papilionoideae
Genus: *Glycine*
Species: *max*

Vegetable Soybean

- Madou- China
- Edamame- Japan
- Pootkong- Korea
- Tua rae- Thailand
- Soya Mochai- Tamil Nadu, India

- **Harvest the green pods after R_6 and before R_7 growth stage**
- **Pods green and seeds fill 80 to 90% pod width**

Mature grains	**≥ 30 g/100 seeds**
Green beans	**65-100 g/100 seeds** **About 65%/M.C.**

Qualifications for Japanese Market

- No. of pods in 500g packet < 175
- Dark green pod and bean color
- Grey pubescence
- Two or more beans per pod
- Length of pod > 5cm, Pod Width > 1.4cm
- Sweet taste (> 10% sucrose content)

- **Pleasant flavor**
- **No yellow pods**
- **No damaged pods (Insect, disease or mechanical)**

Vegetable soybeans are sweet

Sugar (Sucrose, Glucose)

Glutamic acid

Free Alanine

The Nutrition of Soybean

- Protein
- Unsaturated fatty acids
- Phytochemicals: Vitamin E, isoflavones, calcium, lecithin and estrogen
- Trouble-free menopause, avoidance of osteoporosis, and avoidance of cancer. (Worrel 1999)

Table 1. Composition of edible protein, minerals and vitamins of vegetable soybeans and green pea

	Vegetable soybean	Green pea
Energy (kcal)	139	94
Moisture (%)	68.2	75.6
Protein (%)	13	6.2
Fat (%)	5.7	0.4
Total carbohydrate (%)	11.4	16.9
Crude fiber (%)	1.9	2.4
Ash (%)	1.7	0.9
P (mg/100 g)	158	102

	Vegetable soybean	Green pea
Ca (mg/100 g)	78	32
Fe (mg/100 g)	3.8	1.2
Vit. A (βcarotene eq.) (mg/100g)	360	405
Vit. B_1 (mg/100 g)	0.4	0.28
Vit. B_2 (mg/100 g)	0.17	0.11
Vit. C (mg/100 g)	27	27

Source: FAO (1972)

THE FARMER

Grain Soybean

Vegetable Soybean

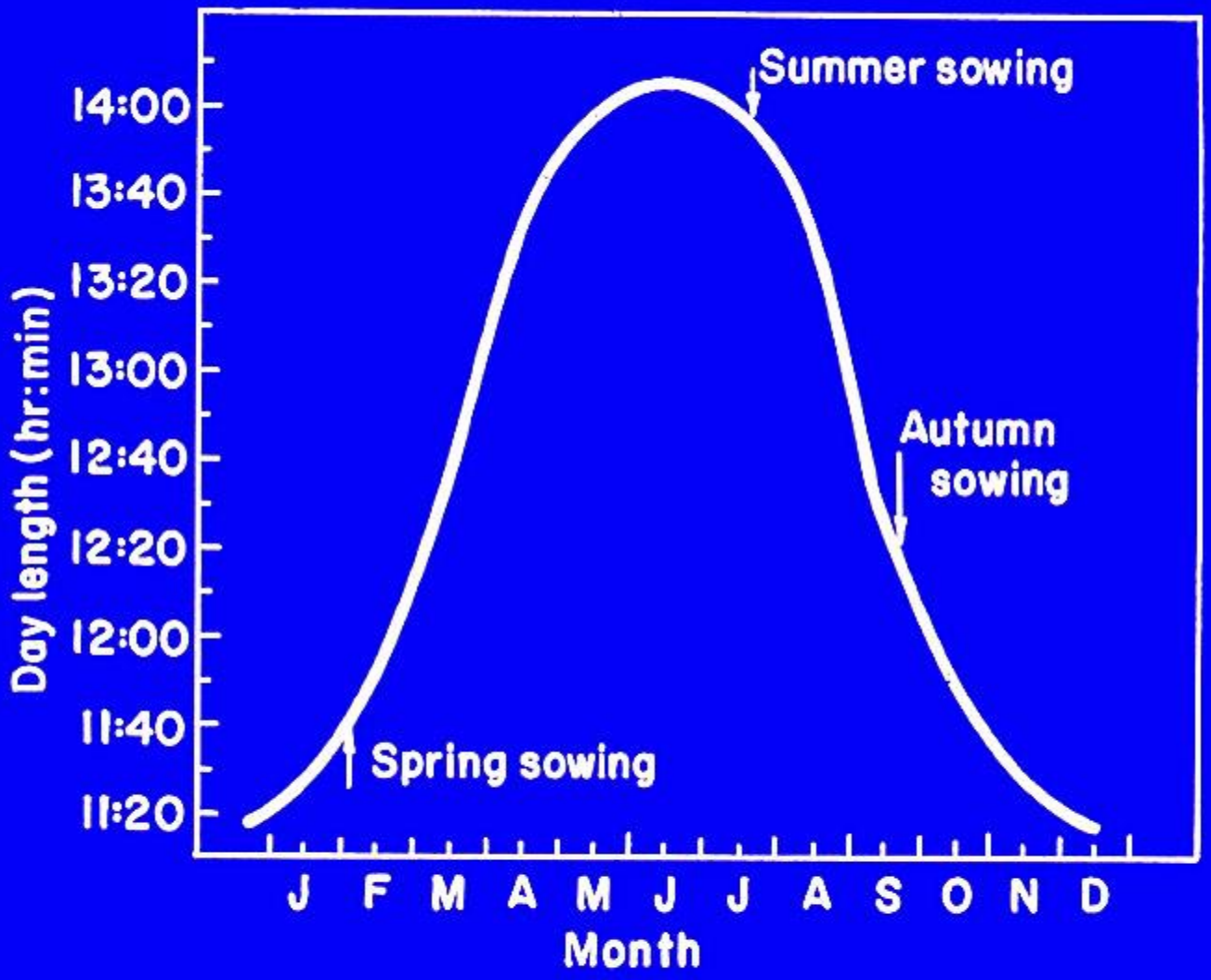
Purple Seed Stain, *Cercospora kikuchii*


Mottling ? SMV

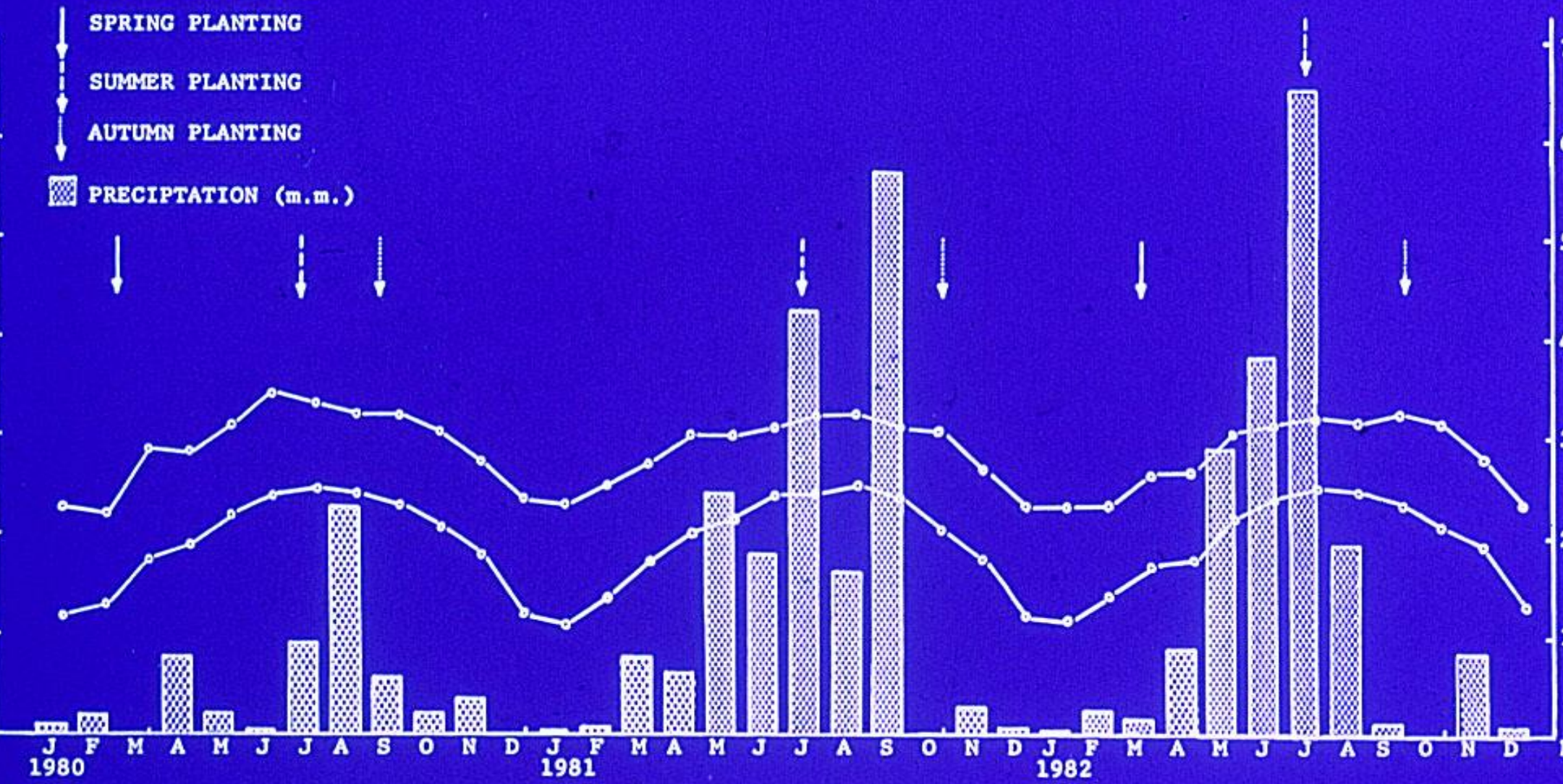

Pythium, Rhyzoctonia, Sclerotinia, Phytophthora

- Cultural Practices

When to plant?



PHOTOPERIOD DIFFERENCE DURING THREE SOYBEAN GROWING SEASONS AT AVRDC.



TEMPERATURE AND RAINFALL PATTERN DURING 1980, 1981 and 1982 AT AVRDC

- **Planting time depends on**

1. **Latitude**
2. **Longitude**
3. **Altitude**

- **Soybean is sensitive to photoperiod and temperature**

In the Tropics & Sub-tropics

- Vegetable soybean can be planted year-round
- Avoid rain during harvest time since it affects the quality of the raw materials
- Continuous planting OK (if nor virus or root disease problem)

Soil & Canopy Temperature

- Soil temp. 13-18C (55 to 65F)
- Canopy temp. 21-32C (70-90F)
- Viny house and Tunnels 21-32C (70-90F) Day and > 7C (> 45) at night
- For pod development 26C Best (78F)


SEKI

Where to get the Vegetable Soybean Seeds?

Check local seed companies
Evergreen Seeds in Taiwan
Takii Seeds co. Japan
Kaneko Seeds, Japan
Clause (Thailand) Co. Ltd.
Ask AVRDC (Sample seeds)

What is the soil pH?
What is the seed rate?
Seed Treatment?

SOIL PH: 5.8 TO 7.0

SEED RATE:120-150KG/HA (30G/100 SEEDS)

TREAT SEEDS: ARASAN OR CERASAN 75% WP @3G a.i./KG SEED

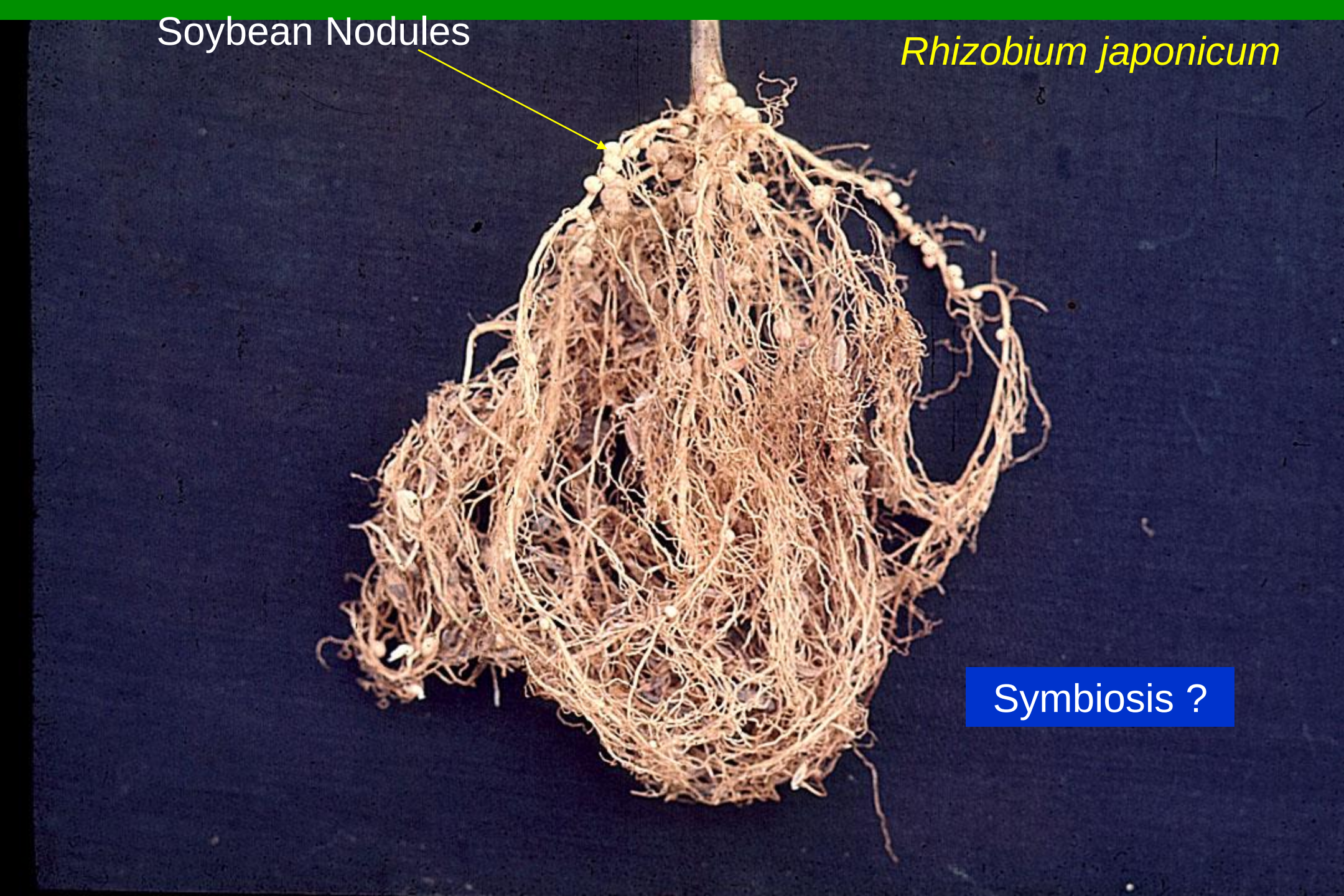
INOCULATE WITH RHIZOBIUM

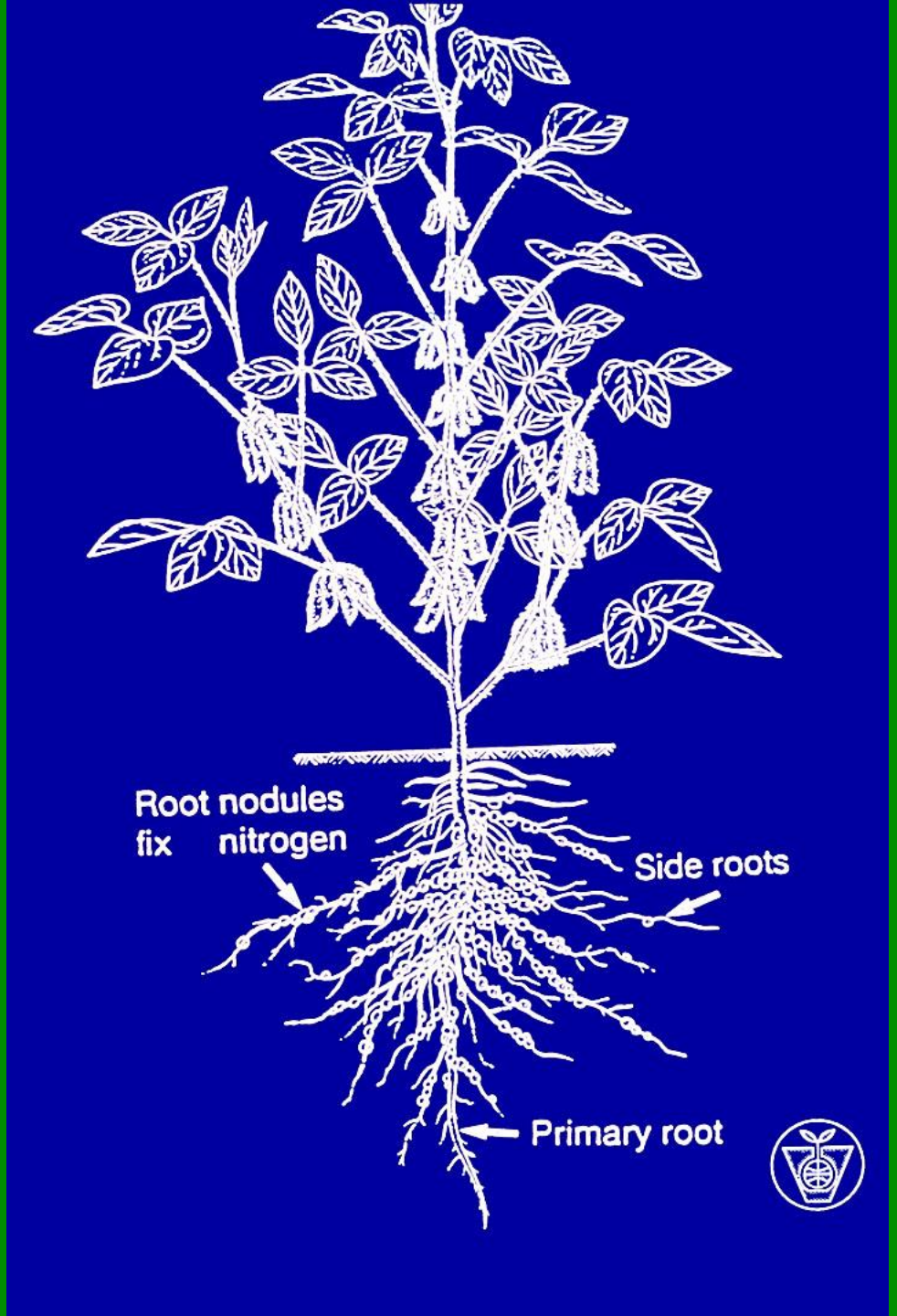
PROTECT FROM BIRDS, RABBITS AND DEERS

Cultural Management

Remember Soybean is a Legume

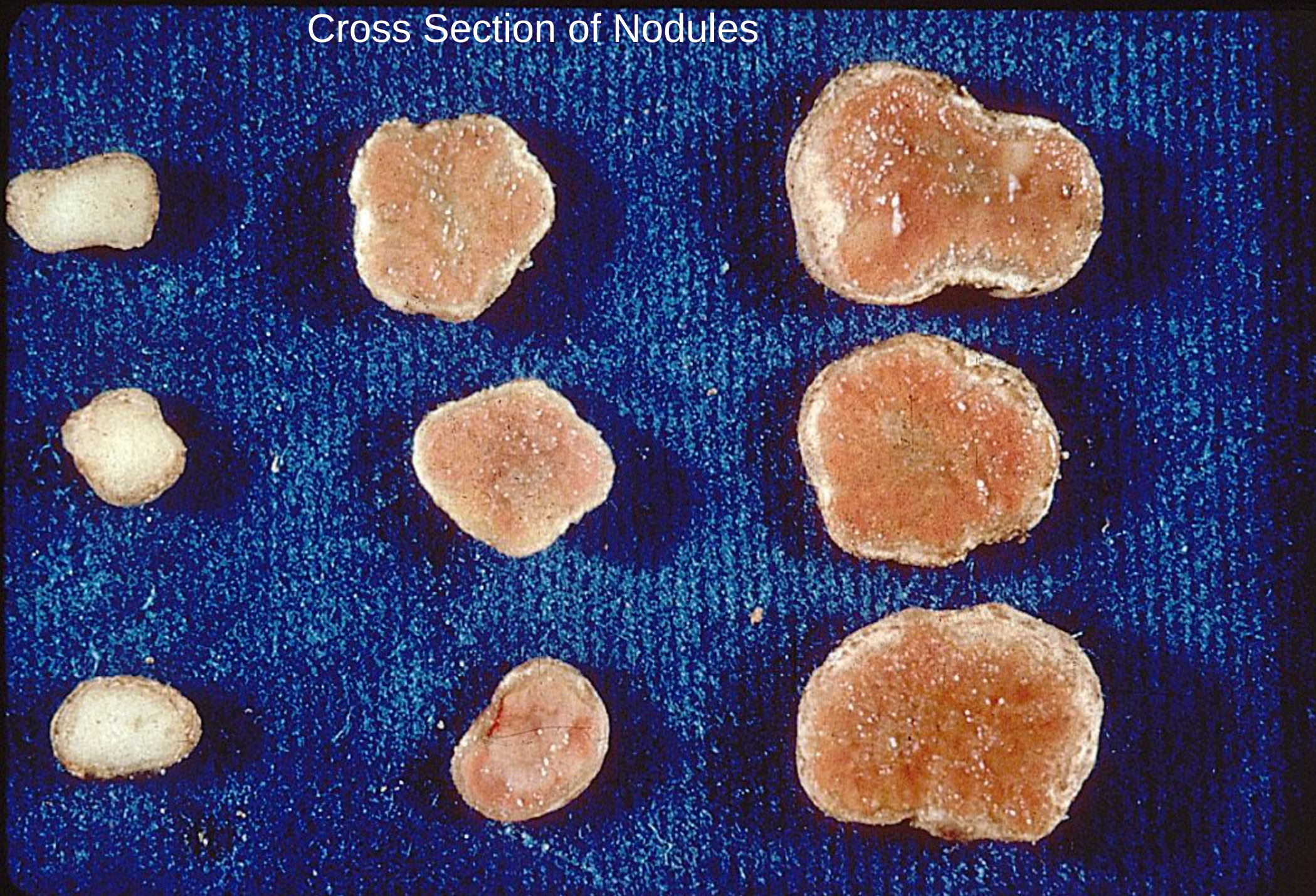
Fertilizer:10t/ha Compost
60Kg N, 30Kg P and 50Kg K/ha
Half as Basal & half at Flowering and Seed filling


Soybean Nodules
Rhizobium japonicum
Symbiosis ?


Root nodules
fix nitrogen
Side roots
Primary root


B 1

Cross Section of Nodules



Weed Control

Lasso (Alachlor)(Imazathepir)
@1.5kg a.i. /ha as Preemerge
Hand weeding until canopy covers

Intercultivation

Twice at 15 to 20 day interval

Spacing and Plant Density

Between Rows: 66 to 91 cm
Within rows: 7.5cm

Plant density: 350,000 to 400,000 plants per ha

Moisture

50% Soil Moisture for Germination

Seed Germinates in 5-10 days

Irrigation

Once every 15 to 20 days

Clay soils less and sandy soils more frequent & based on rain

CRITICAL:Flowering & Seed filling

VALUE CHAIN

- Reduce Cost of Production
- Improved Planting Methods
- Time Savings
- Quality Concerns

To conduct a Value Chain Analysis

- Identify each part of its production process
- Include the cost of each of the goods or processes or services
- Analyze and identify steps that can be eliminated
- Evaluate and identify steps that can be improved

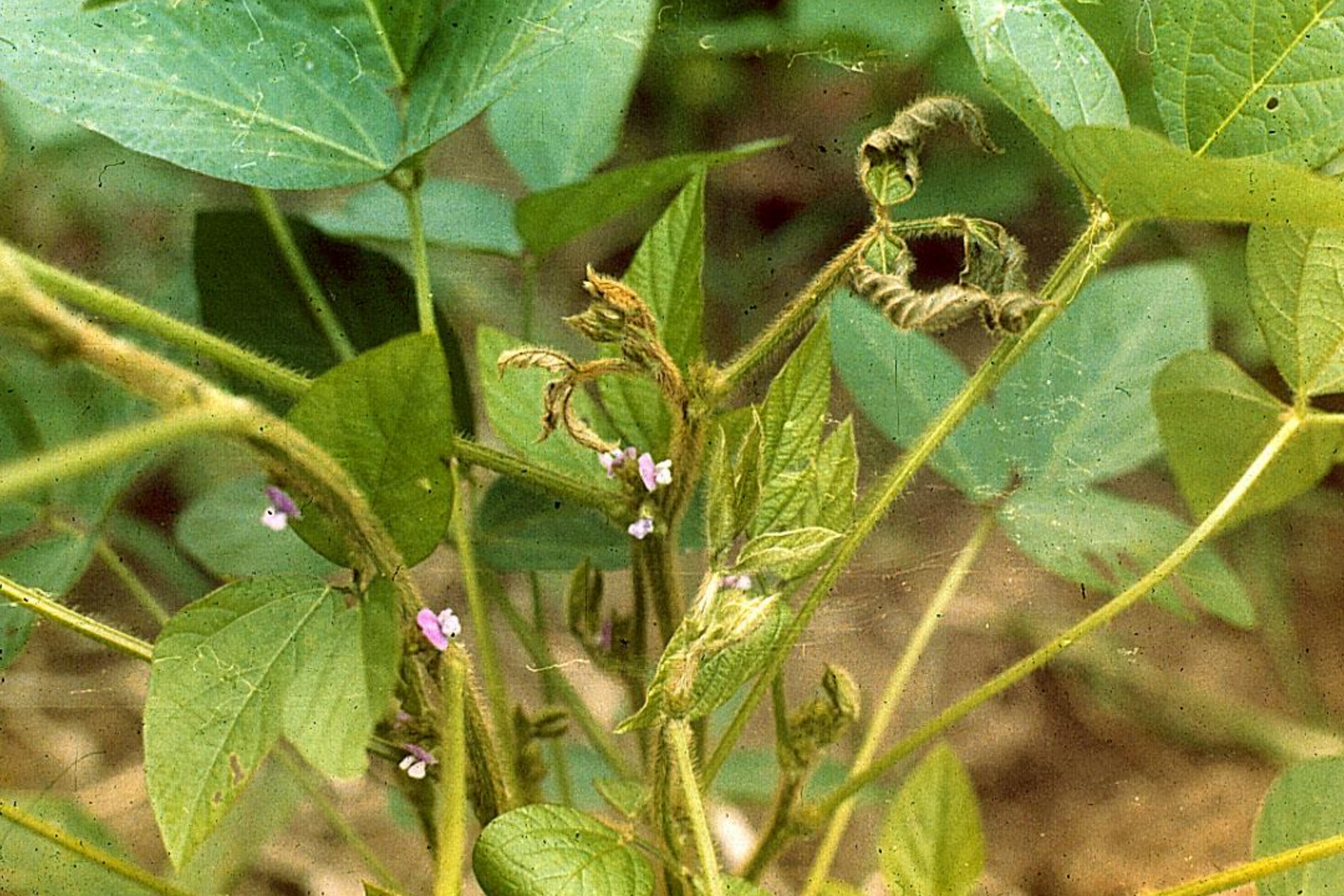
  - Cost savings
  - Time savings
  - Increase production
  - Improve quality
  - Competitive advantage

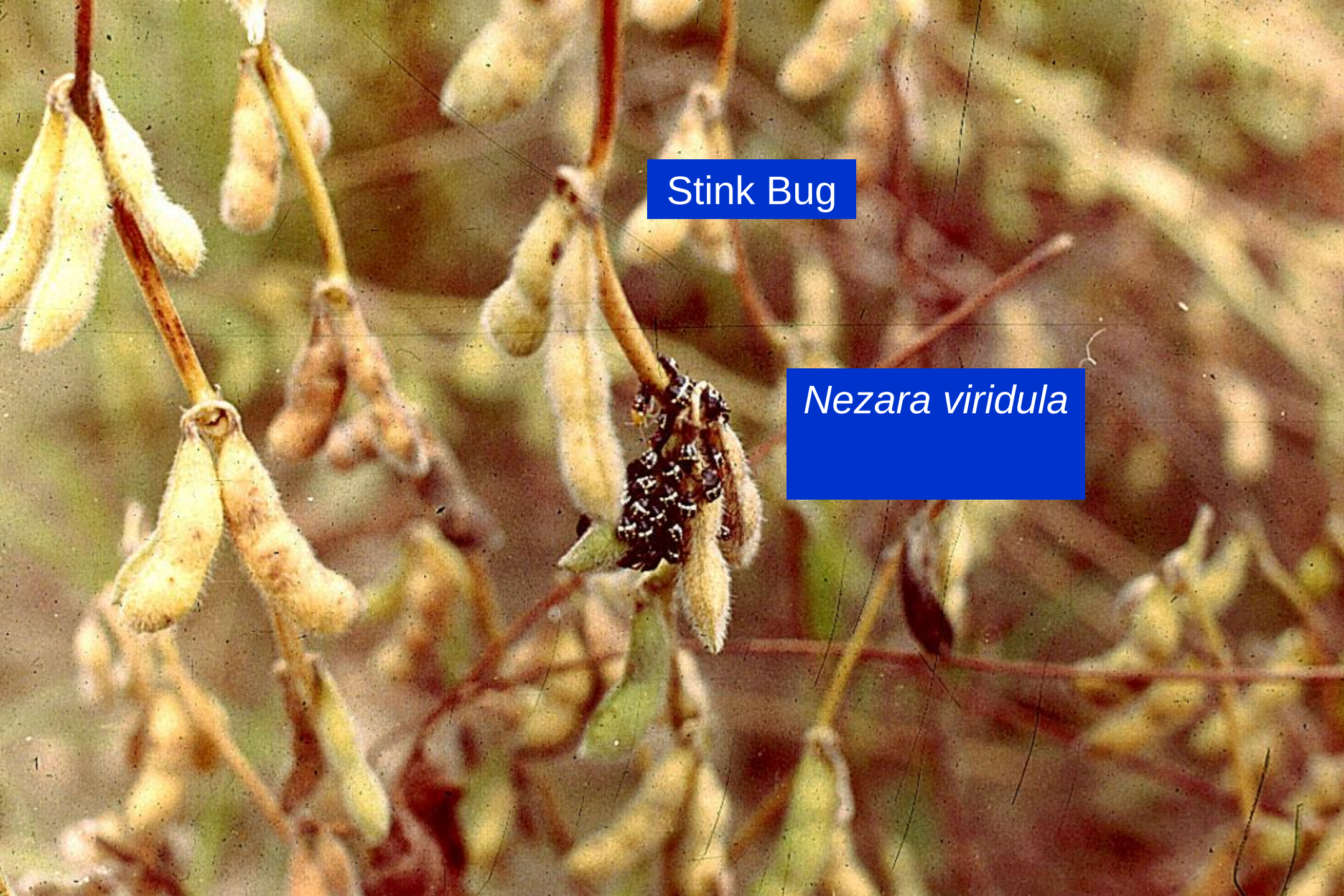
INSECT PESTS

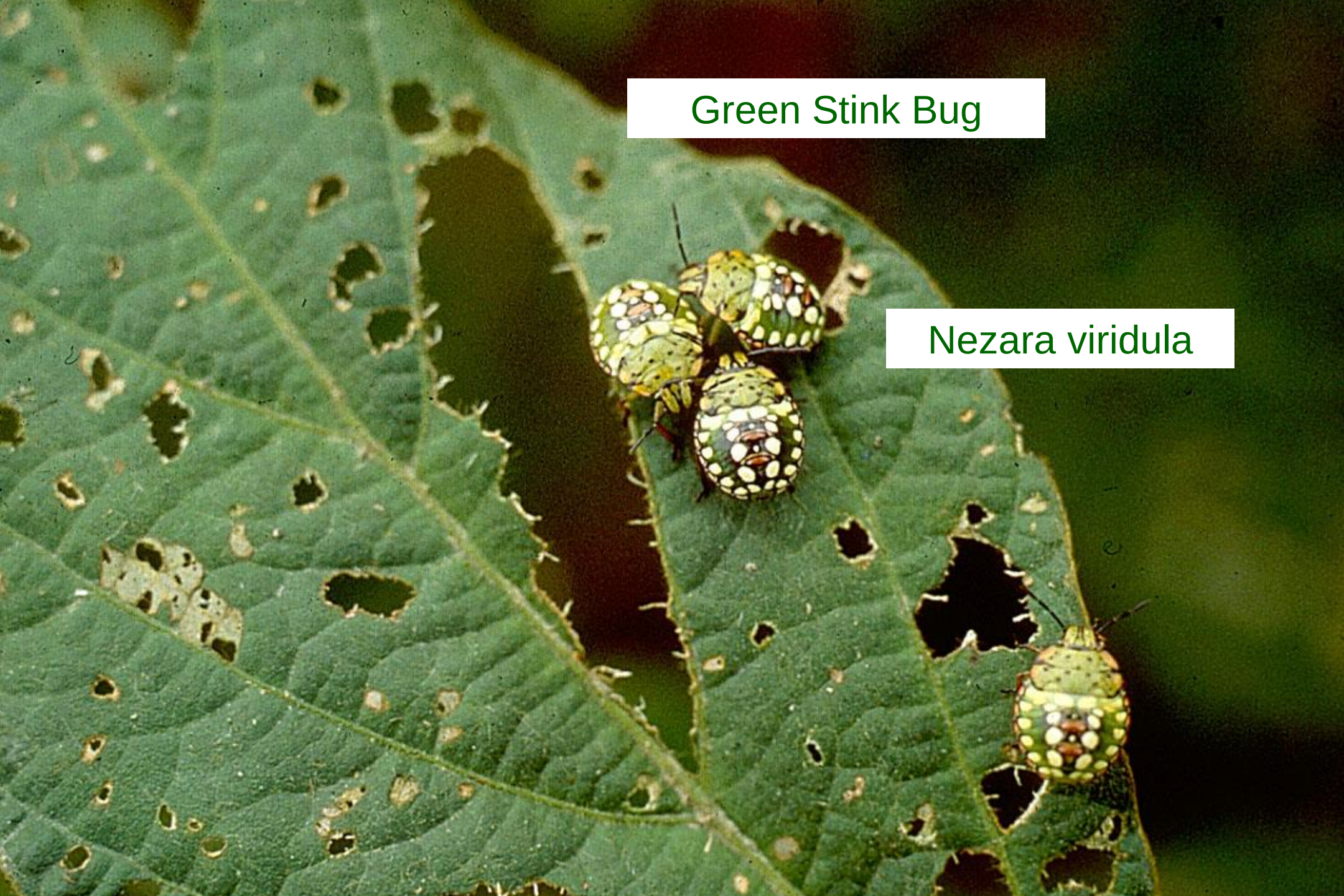
Melanagromyza sojae, Ophiomyia centrosematis, Ophiomyia phaseoli,


Maggots and Pupae

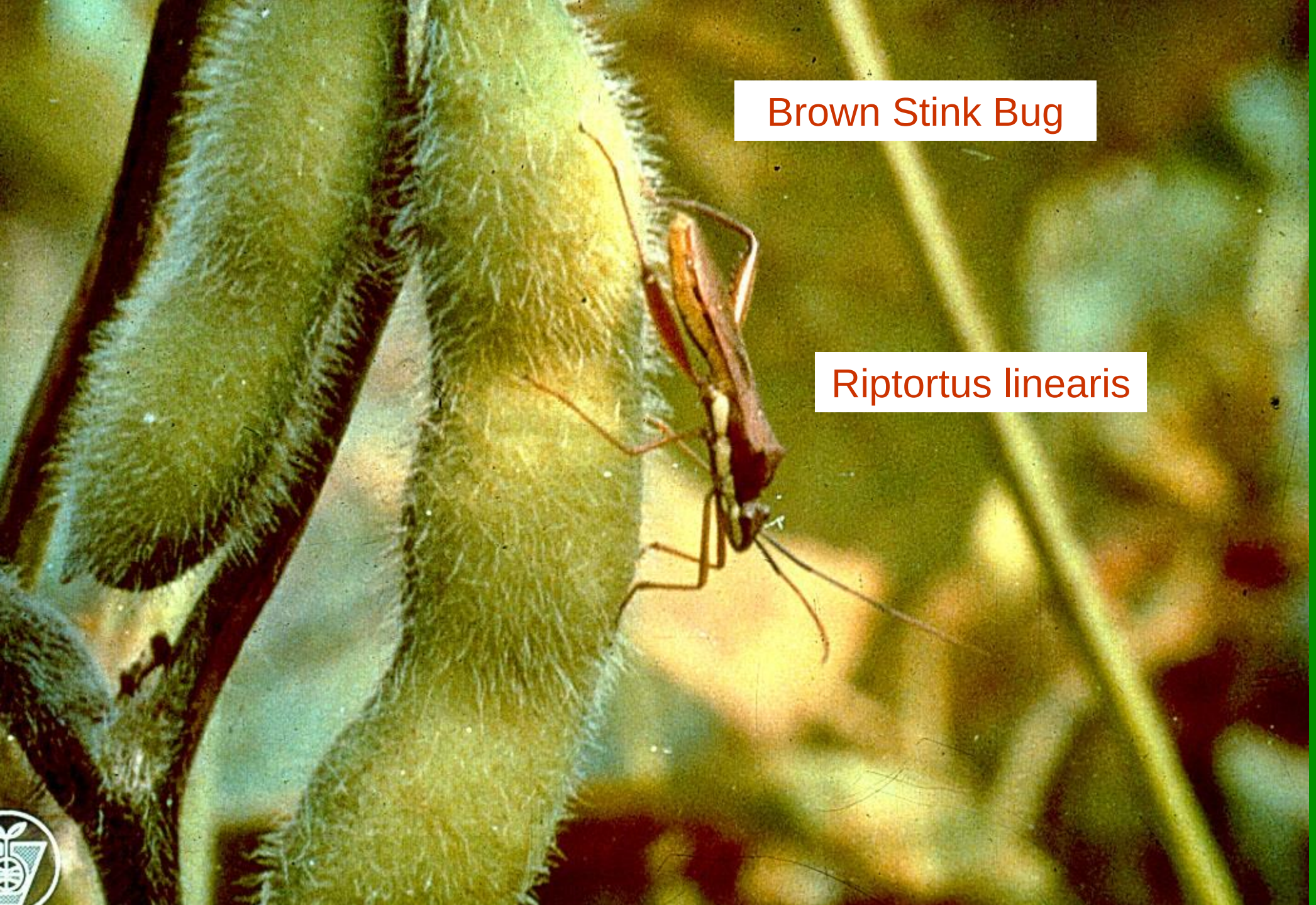

Dolichostigma sp
Pulvinus



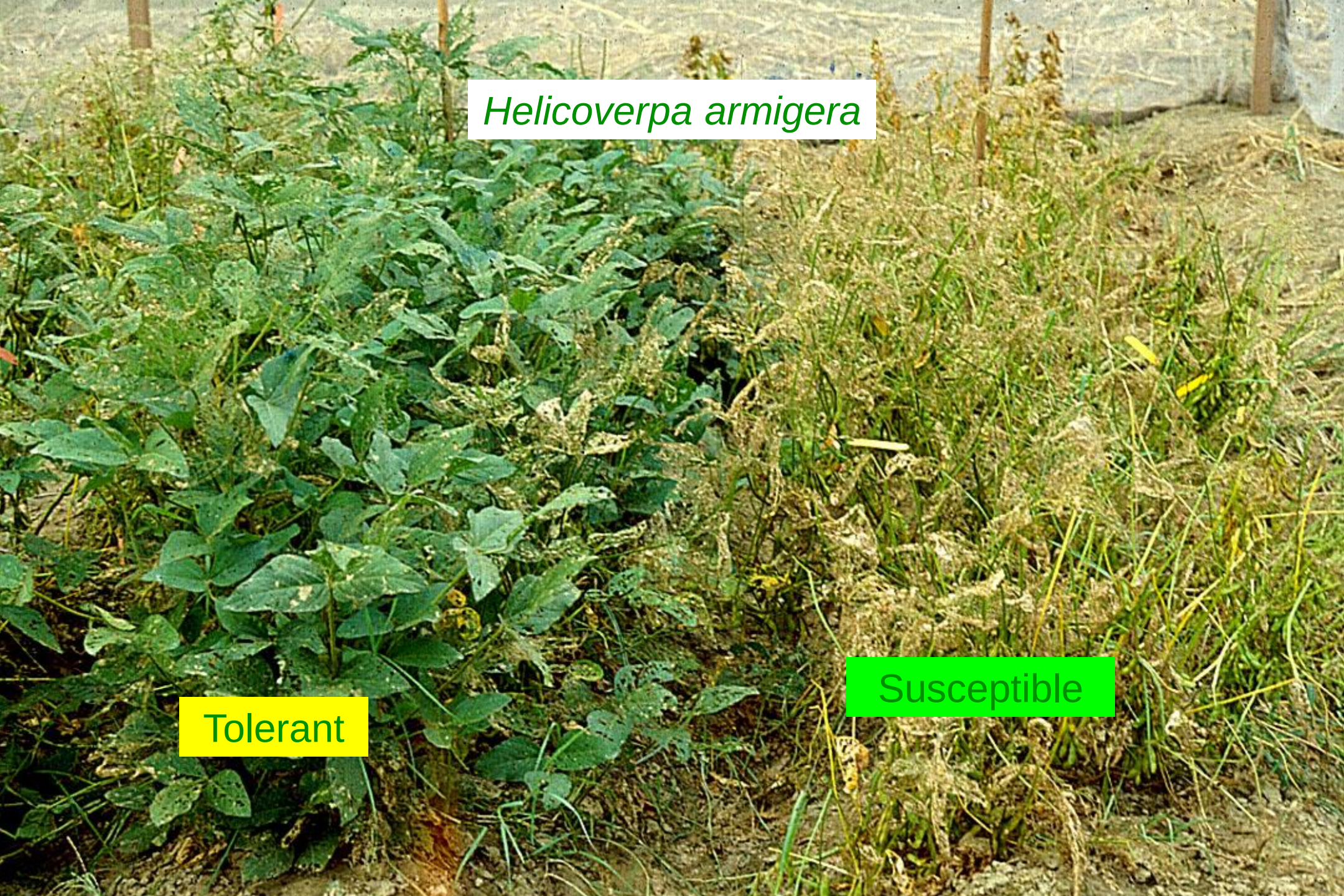

Stink Bug
Nezara viridula


Green Stink Bug
Nezara viridula

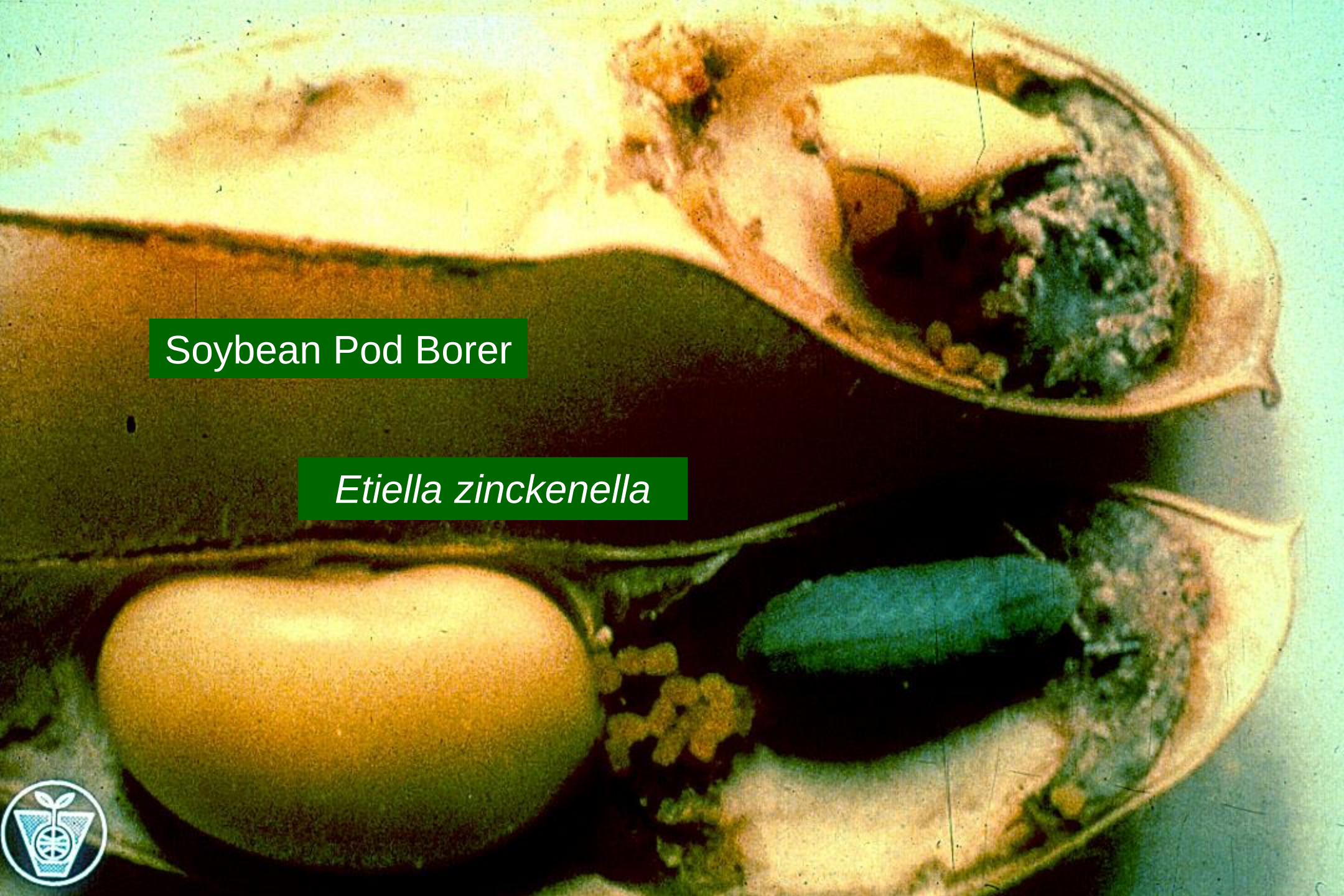

Small Stink Bug
Piezodorus guildinii

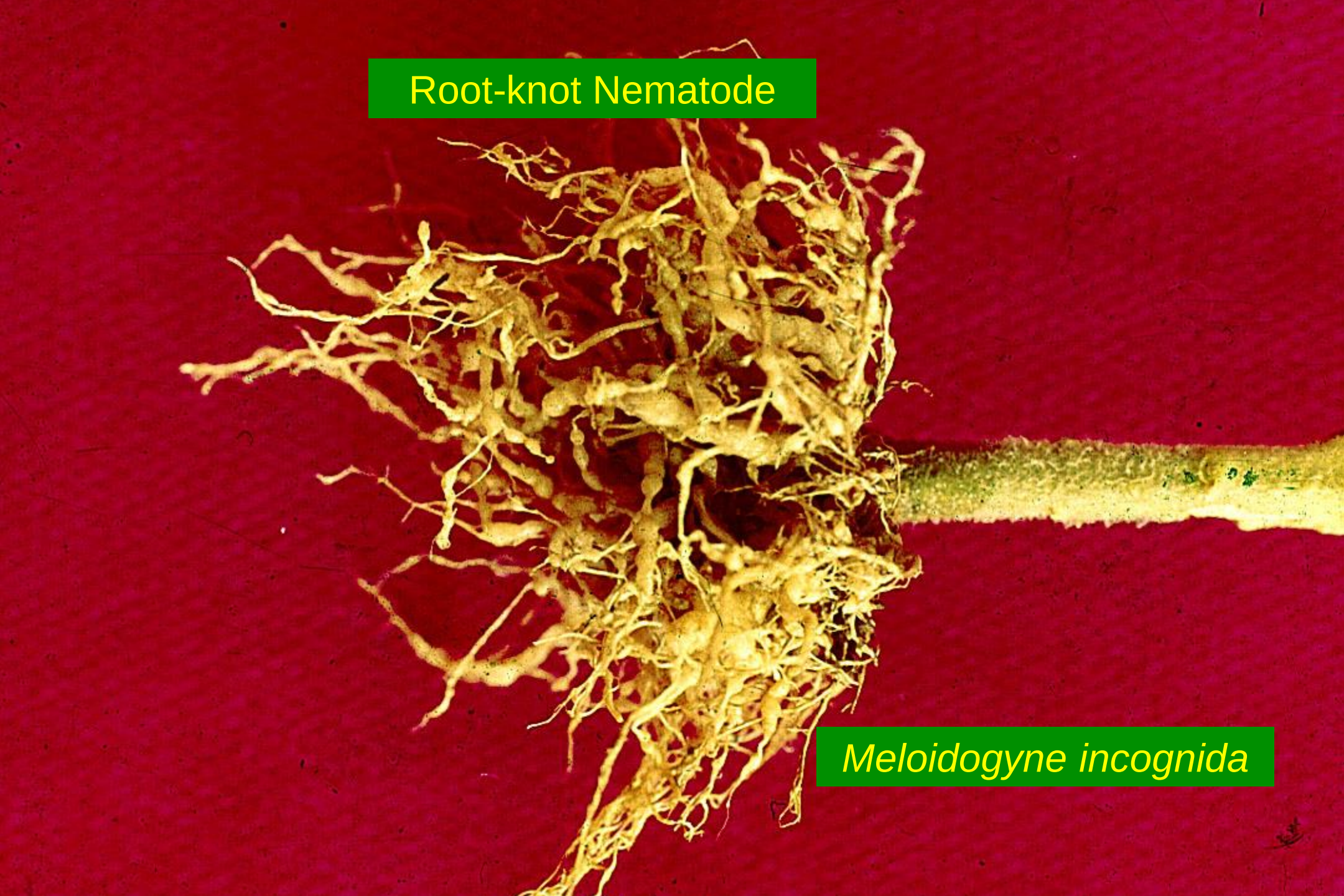

Brown Stink Bug
Riptortus linearis


Spodoptera exigua


Helicoverpa armigera
Tolerant
Susceptible

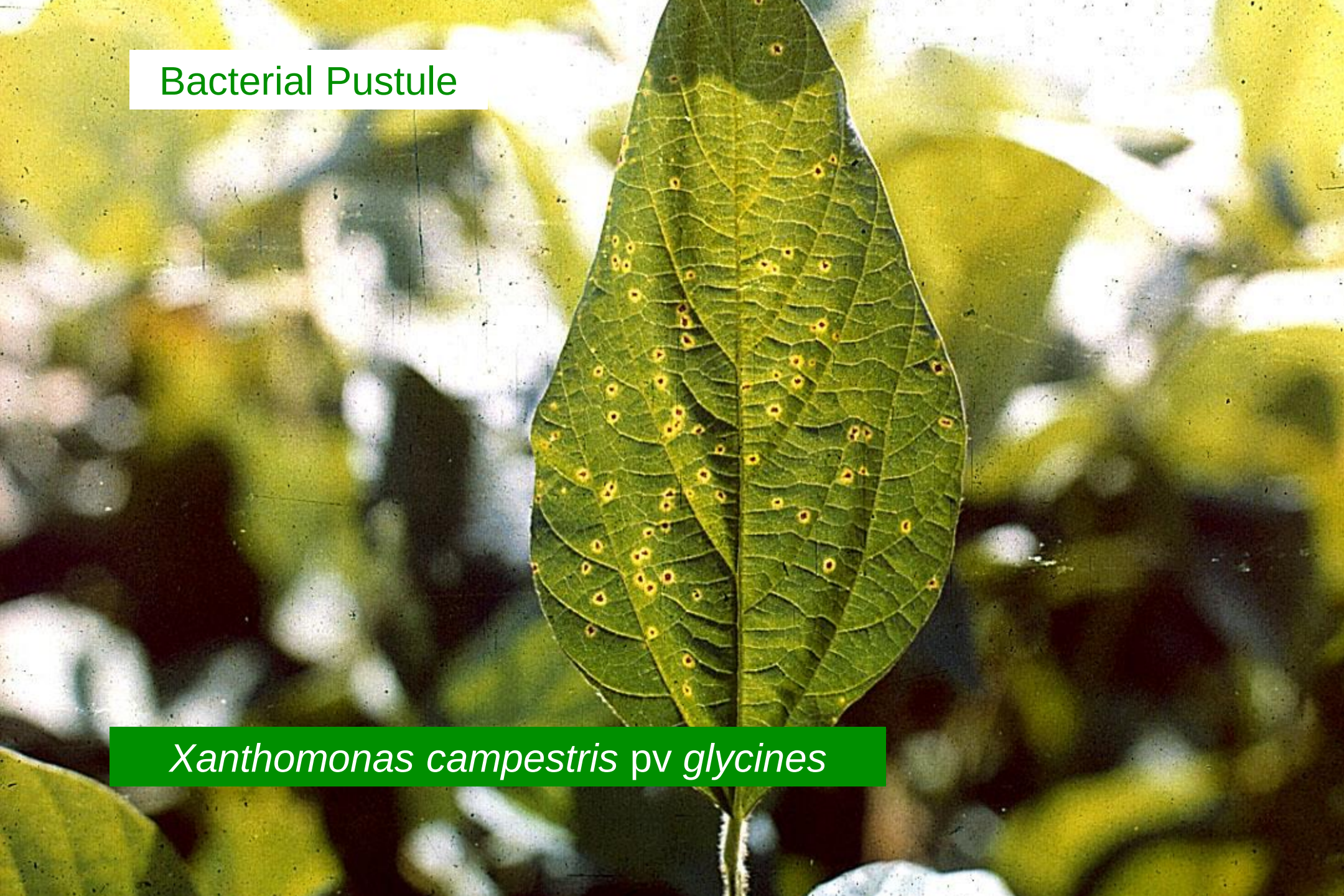

Helicoverpa armigera
H. zea

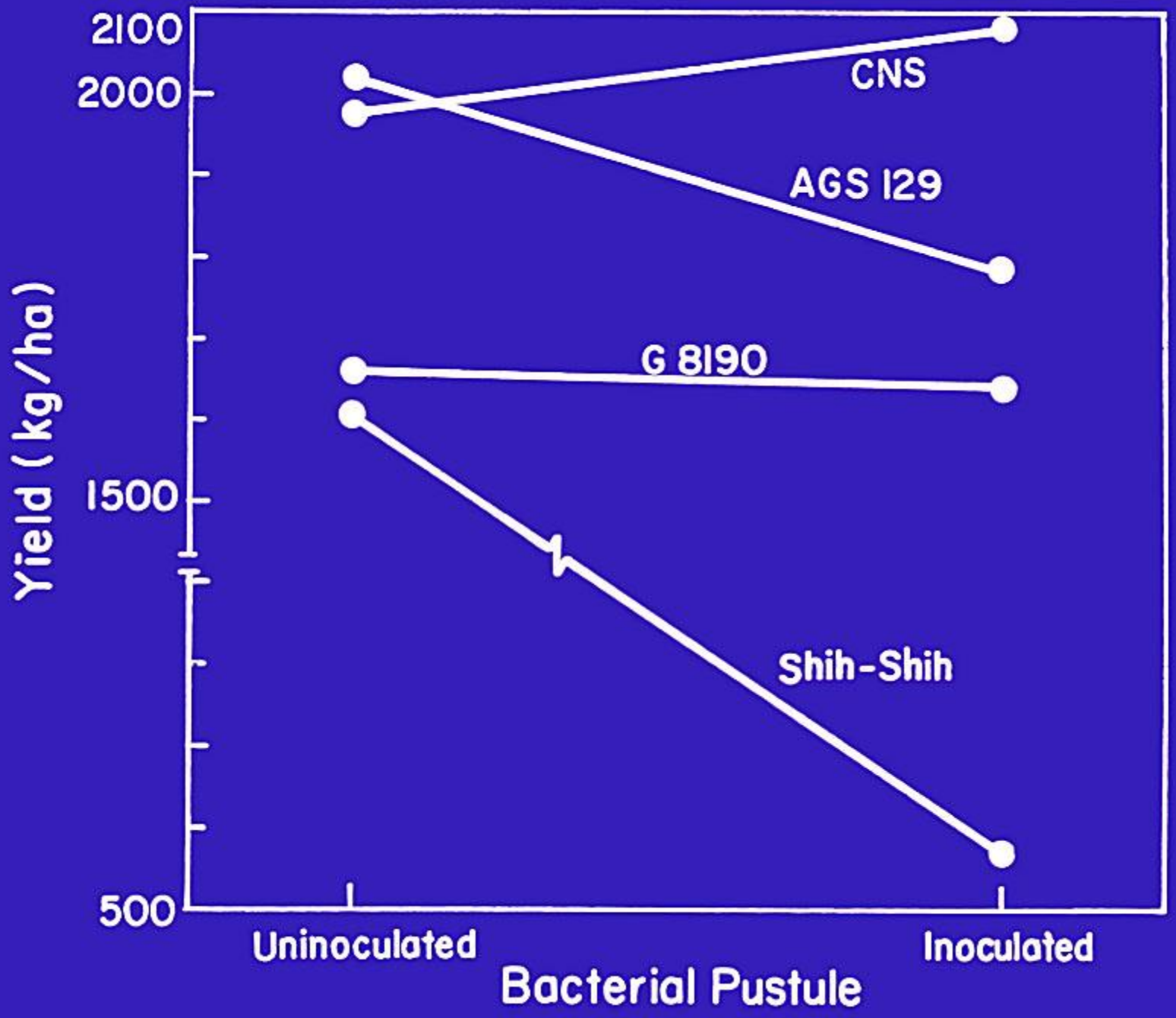

Soybean Pod Borer
Etiella zinckenella

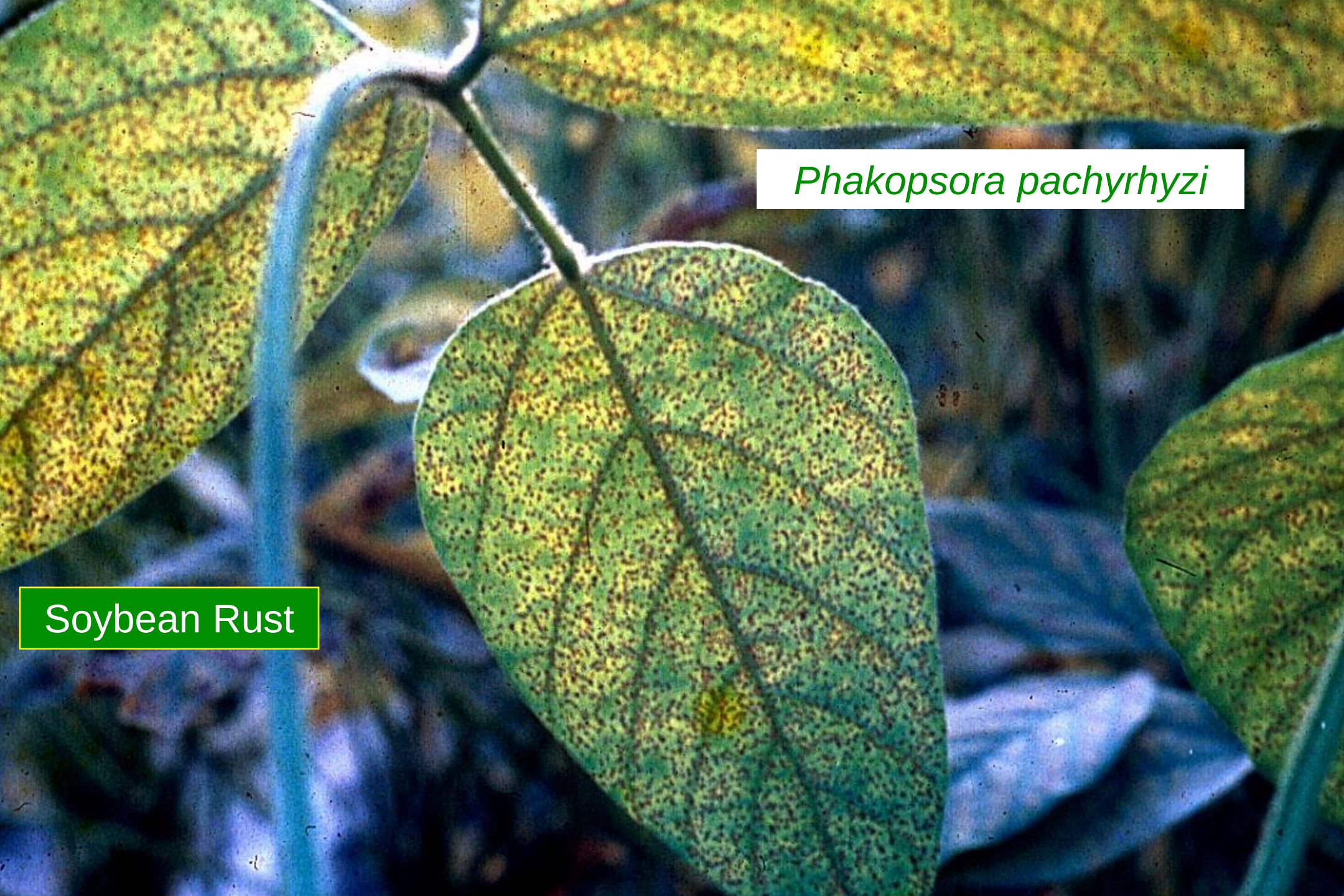

Root-knot Nematode
Meloidogyne incognida

DISEASES


Downy Mildew
Pseudoperonospora manshurica


Bacterial Pustule
Xanthomonas campestris pv *glycines*


2100
2000
1500
500
Yield (kg/ha)
CNS
AGS 129
G 8190
Shih-Shih
Uninoculated
Inoculated
Bacterial Pustule


Phakopsora pachyrhyzi
Soybean Rust


Sporulating Uredinia
TAN Lesion


RB Lesion


Yellow Mosaic Virus


Soybean Mosaic Virus

Plant Protection Costs

How much is the cost?

How to reduce/minimize the cost?

Strategies

Consequences/Health/Environmental

Consumer


Summer season


22 - 06

HARVESTING

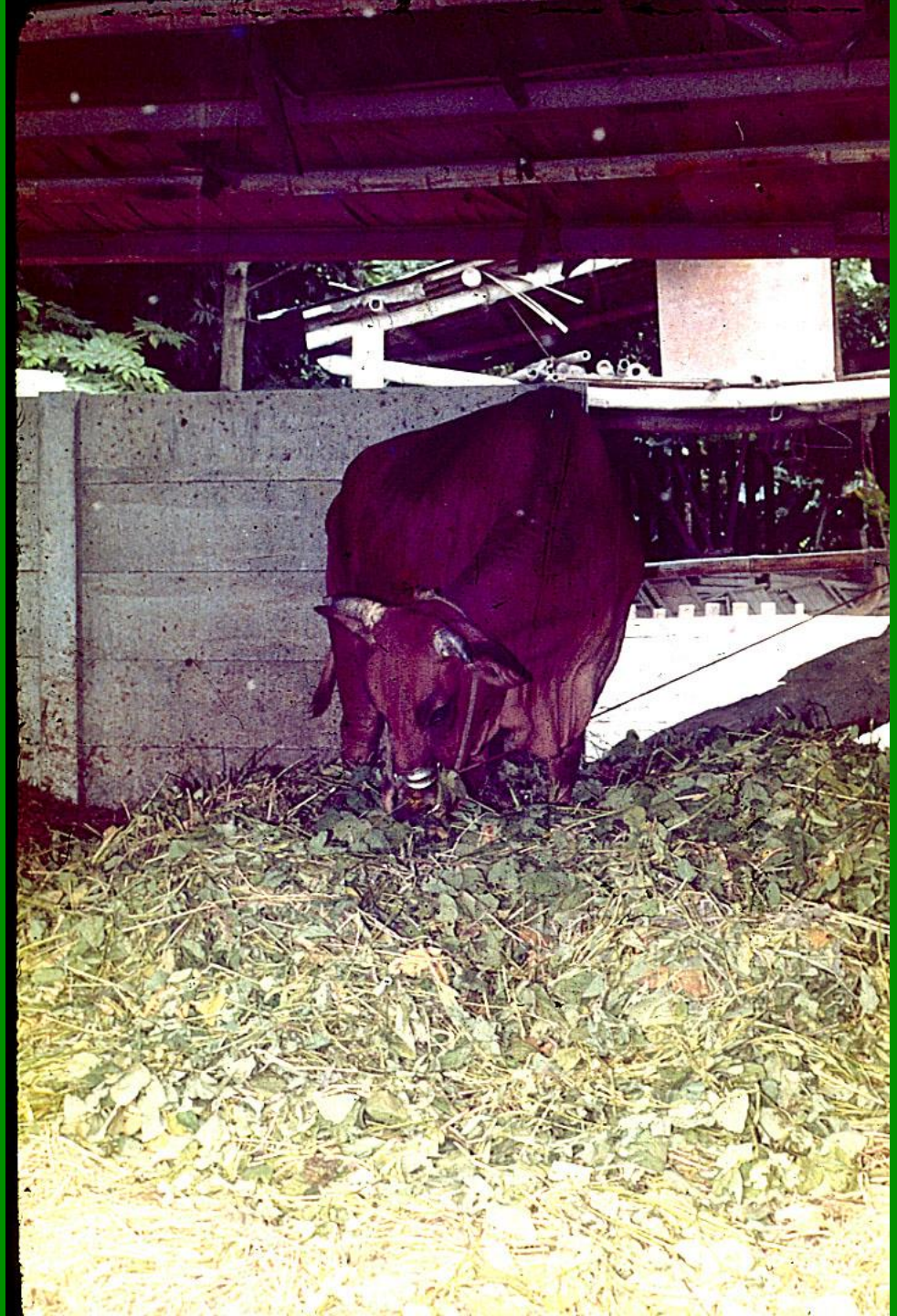
Avoid Rain during Harvest


MAZDA
1485


MAZDA
MAZDA
MAZDA


'93 11 13


80-09071



- **Total biomass = 40 t/ha**
  Pods = 10 t/ha
  Dry matter of residue = 6 to 6.6 t/ha
  N, P, K of residue = 170, 18, 150 kg/ha

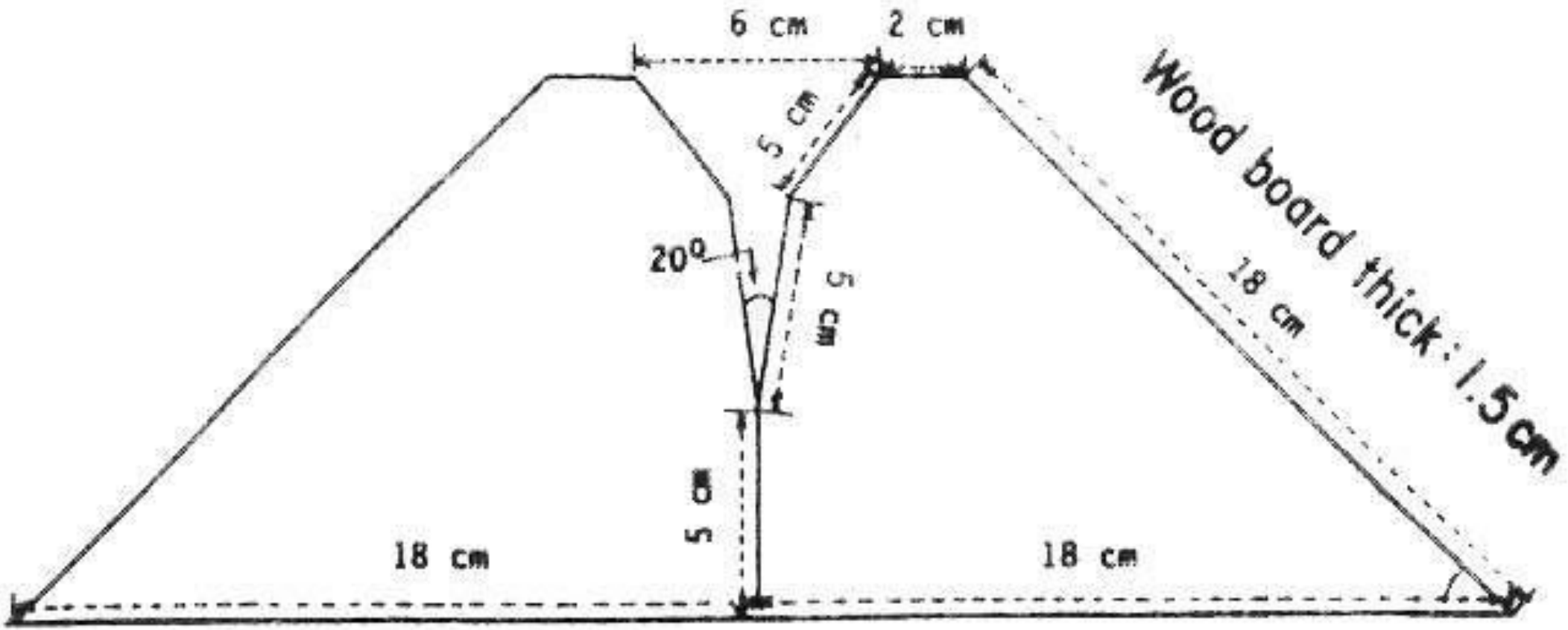

GOLD

Value Chain

- Improve Harvesting
- Reduce Labor needs
- Reduce production cost
- Improve efficiency
- Improve product quality
- Social consequences

Improved Processing Equipments

Manual Thresher can thresh 5-8 kg/hr



S$2,800

5 TO 30 KG/hr

6 to 8 times faster than manual stripping


US$394,000
FMC
9 27 '94


8.6.1-
5


81 5 5

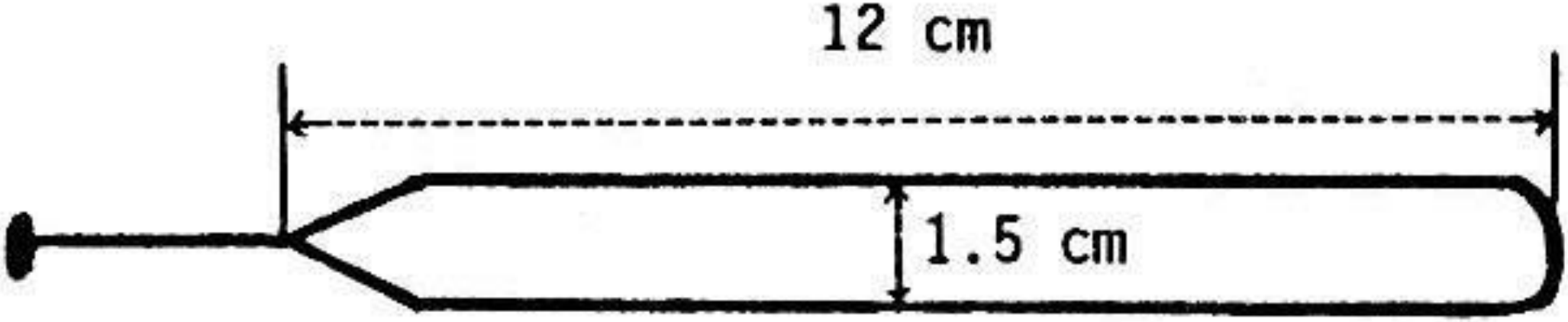

FMC


FMC


NATIONAL VEGETABLE SOCIETY
NVS
LARGE GOLD MEDAL

Processing Equipments

US$6,000



Wooden round handle with nail

Iron nail : 1.5'


US$10,000
Shell20 to 30 kg/hr

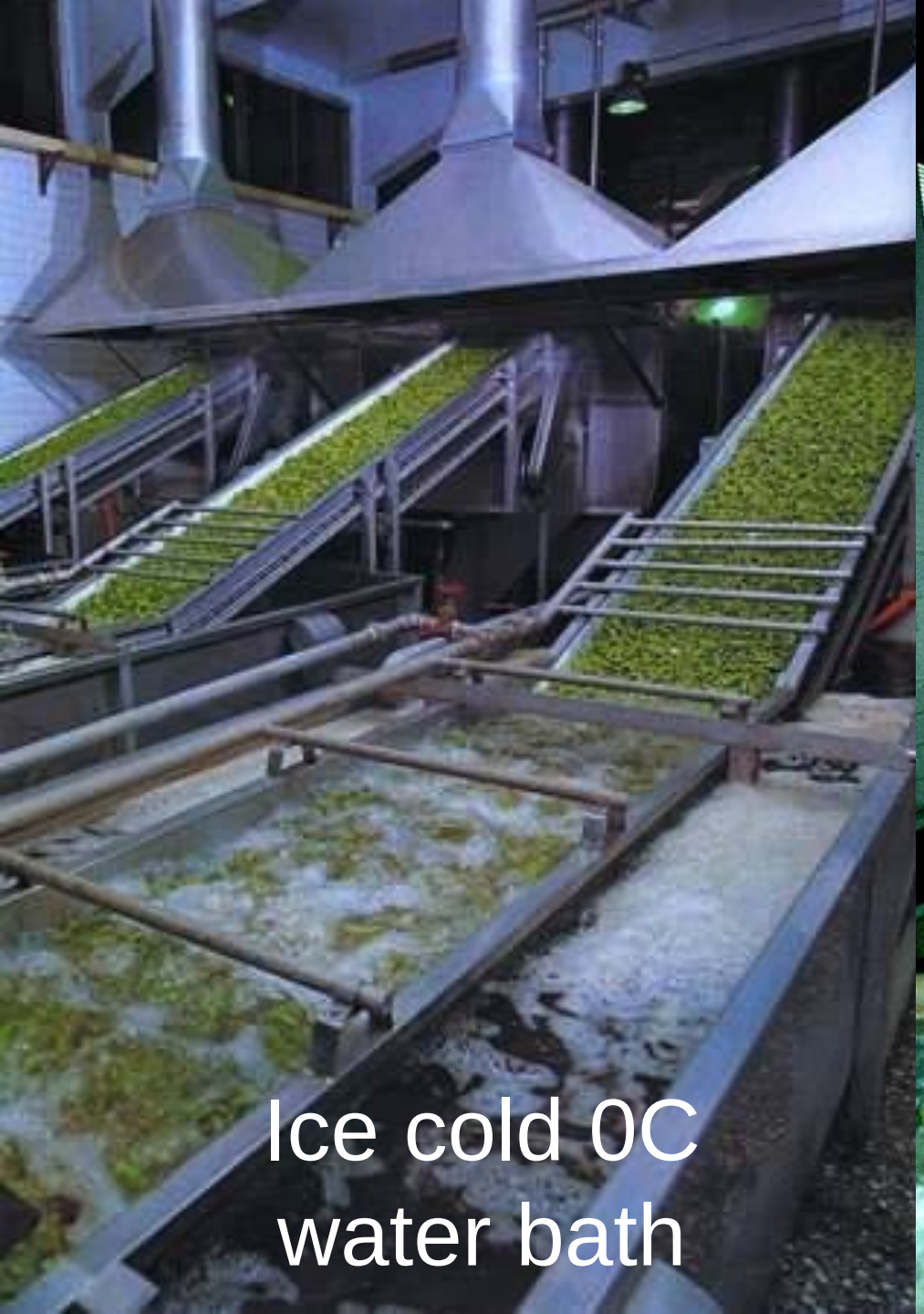

專利證號78205421

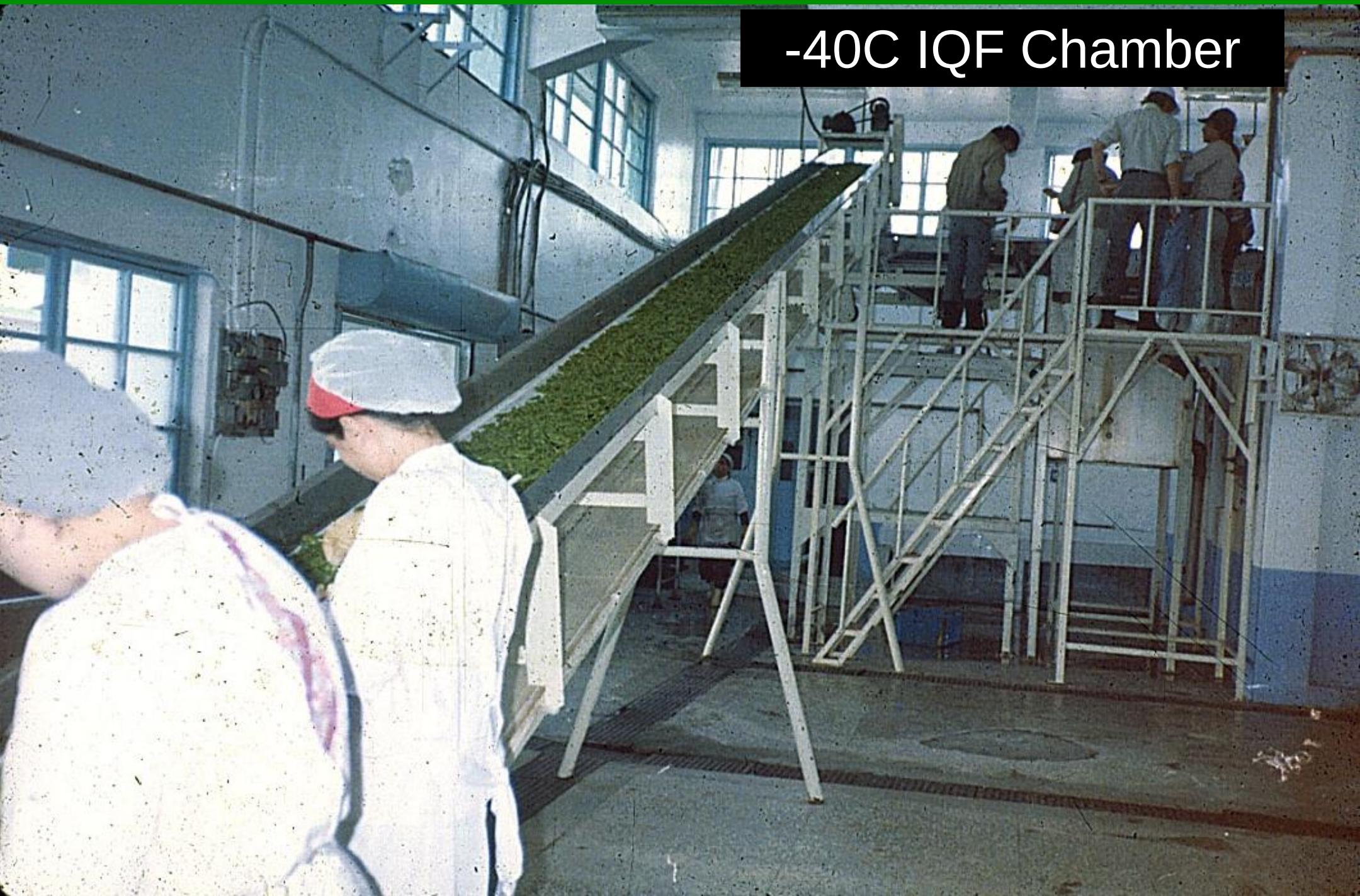
Shelling Machine

Sorting Machine

Processing for Value Addition


Blanching 1.5 to 3 min
@ 98-100C


Ice cold 0C
water bath


-40C IQF Chamber

Sanitation Quality

Total bacteria count<3 million/g
Totally free from *Escherichia coli and Salmonella*


-18C Cold Storage Room


SHOWA

Frozen Food Processing Companies = 27

Small = 50 ha and 304 t volume

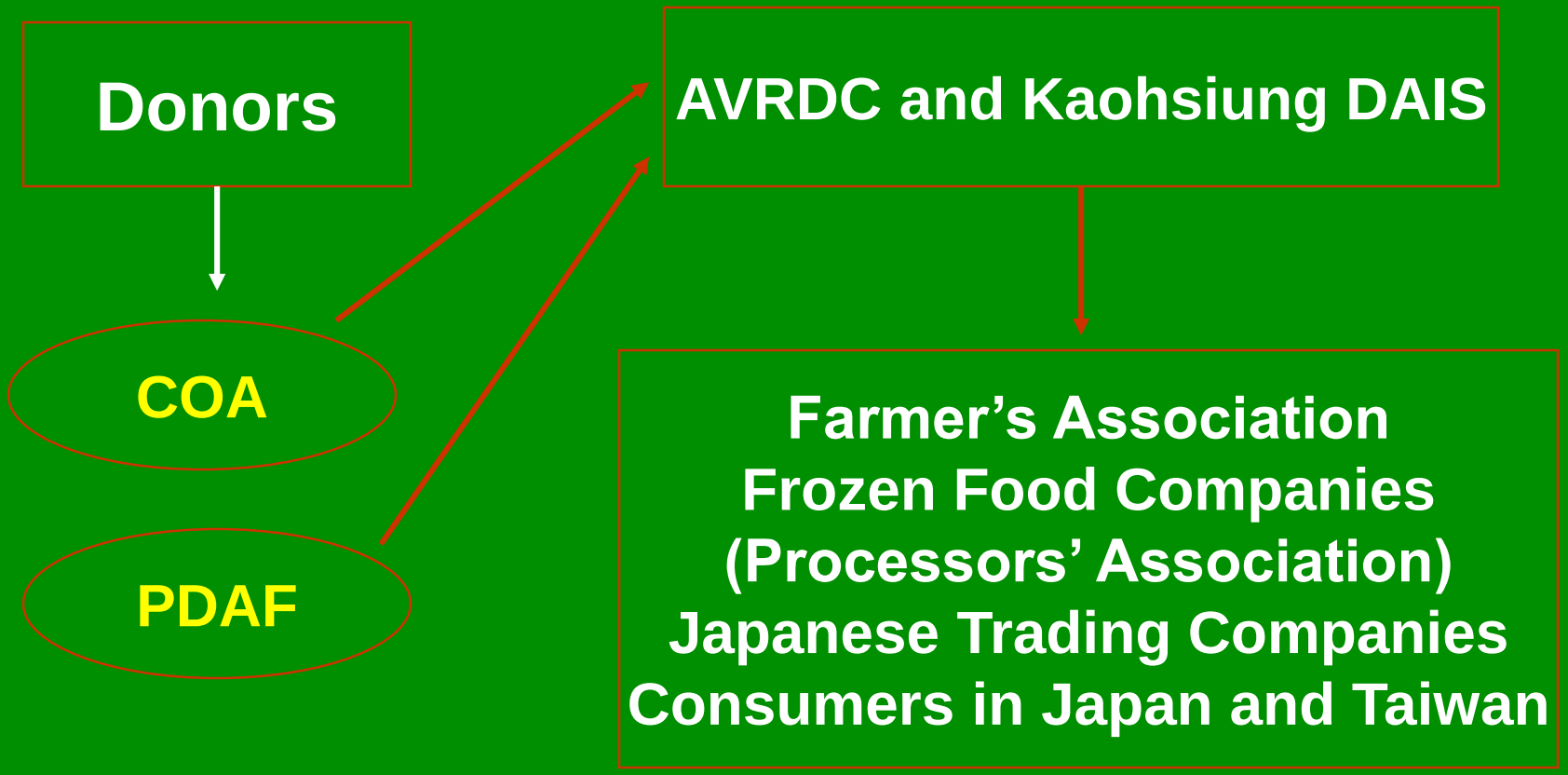
Large = 2,025 ha and 11,552 t/annum

Most have factories in China

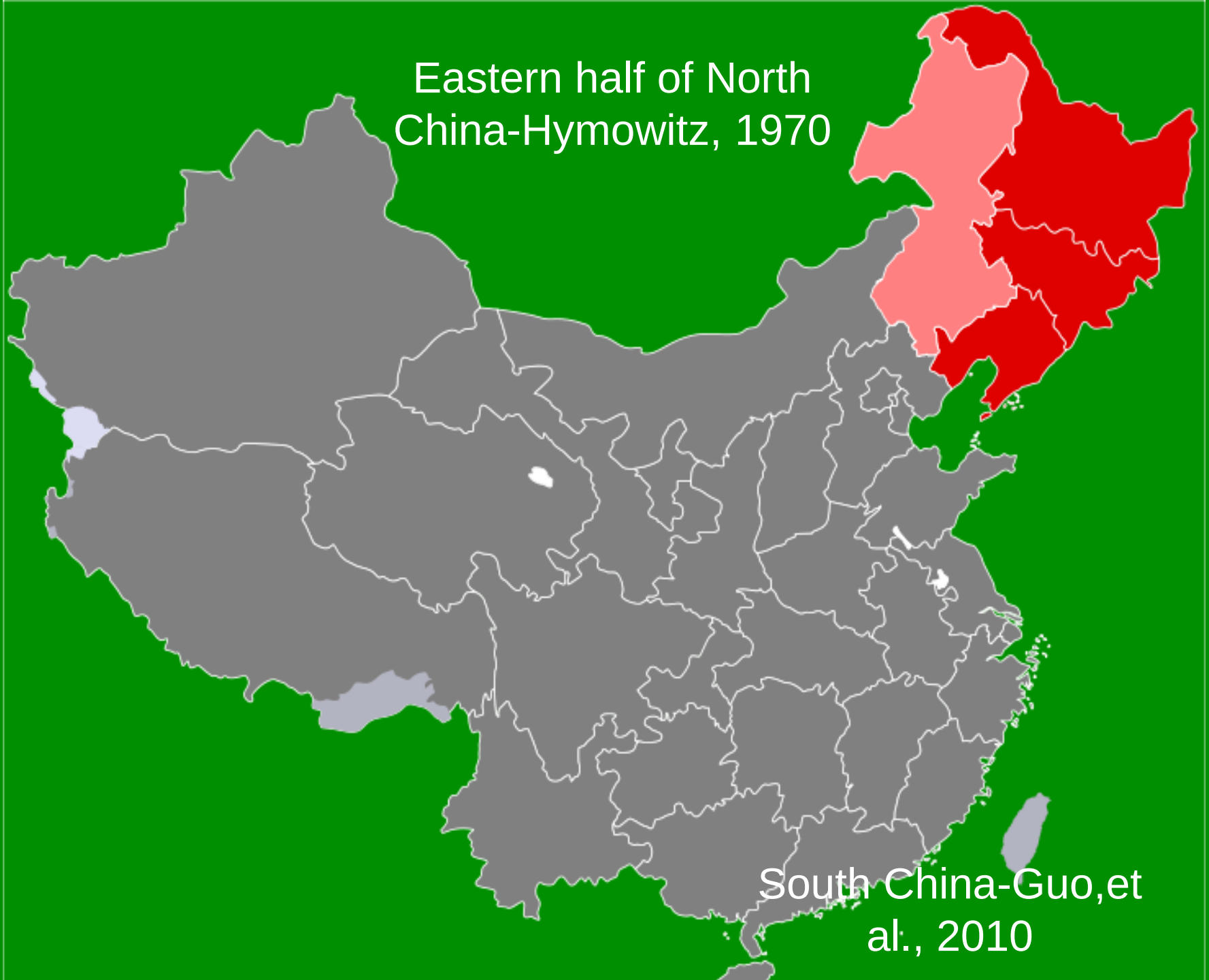

DO THE
PUYALLUP
GATHERING
THE
HARVEST
FUN FUN
FUN

Vegetable Soybean Research

AVRDC-The World Vegetable Center


Donors
AVRDC and Kaohsiung DAIS
COA
PDAF
Farmer's Association
Frozen Food Companies
(Processors' Association)
Japanese Trading Companies
Consumers in Japan and Taiwan

THE ORIGIN OF SOYBEAN


Eastern half of North China-Hymowitz, 1970
South China-Guo,et al., 2010

WORLD SOYBEAN GERMPLASM COLLECTION

Country	No. of accessions	% of Total
China	32,021	14
USA	21,075	9
Korea	17,644	8
AVRDC	15,314	7
Brazil	11,800	5
Japan	11,473	5
Russia	6,439	3
India	4,022	2
Total (World)	229,947	100

GENUS	Species	No. of accessions
GLYCINE	argyrea	3
GLYCINE	canescens	21
GLYCINE	clandestina	8
GLYCINE	curvata	1
GLYCINE	cyrtoloba	5
GLYCINE	falcata	4
GLYCINE	formosana	2
GLYCINE	gracilis	2
GLYCINE	javanica	8
GLYCINE	latifolia	8
GLYCINE	latrobeana	2
GLYCINE	max	13996

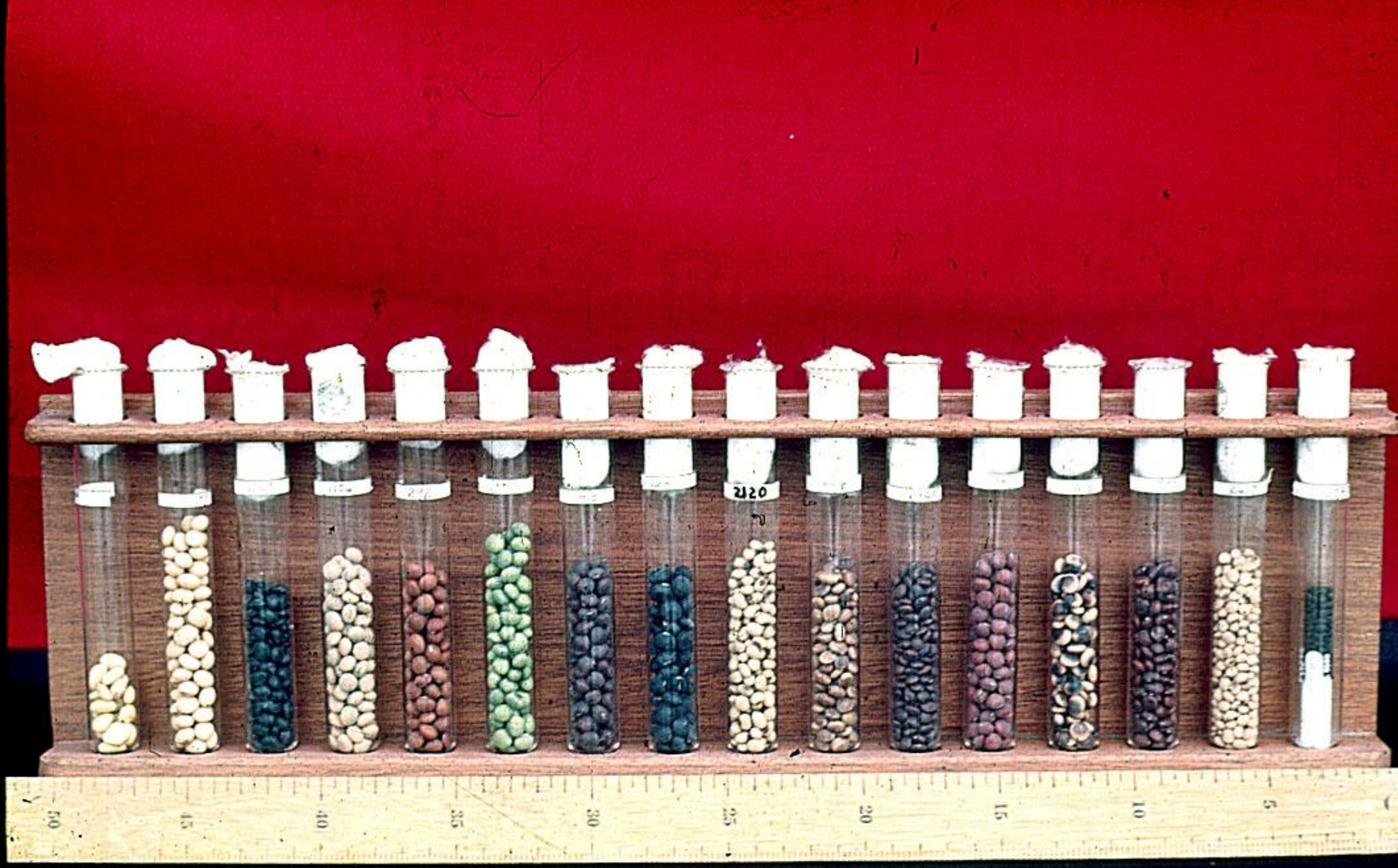
Source: AVRDC 2013

Glycine microphylla	5
Glycine soja	1212
Glycine sp	15
Glycine tabacina	14
Glycine tometella	12
Glycine tomentosa	3
Total	15321

Source: AVRDC, 2013

AVRDC Vegetable Soybean

Germplasm Evaluated- 8664
Vegetable Types identified- 184
(100 Seed Weight 30g or >)
It is 2.1%


2120
50
45
40
35
30
25
20
15
10
5

- **Commenced in 1985**
- **Objective: Develop Vegetable Soybean for Japanese market**
- **Prior to 1985, Taiwan had**

  Shih Shih

  205 (Tzuzunoko)

  305 (Ryokkoh) } **From Japan**

- Seeds imported from Japan by frozen food company
- Middle man contract with farmer
- Seed and other inputs and advice given
- Management farmer
- Harvest middle man

- **AGS 292**
- **Pureline from Taisho Shiroge**
- **Released as Kaohsiung No. 1**

- **AGS 292**
- **Released as Kaohsiung No. 1**
- **Mauritius**
- **Thailand**
- **Sudan**
- **Hawaii**
- **Washington**
- **Ohio (BeSweet 292-Rupp Seed)**
- **Oregon (Buker’s Favorite)**
- **South Carolina**


AGS 292

KPS 292

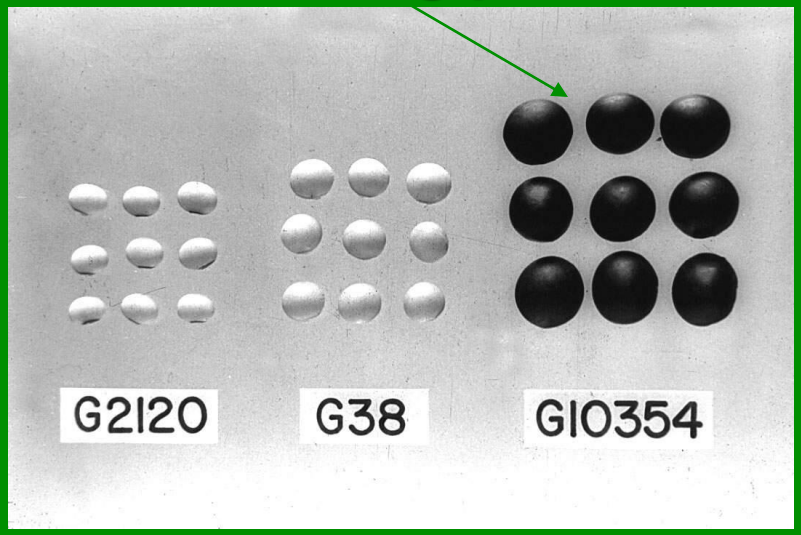
AGS 292 Released as

KPS 292

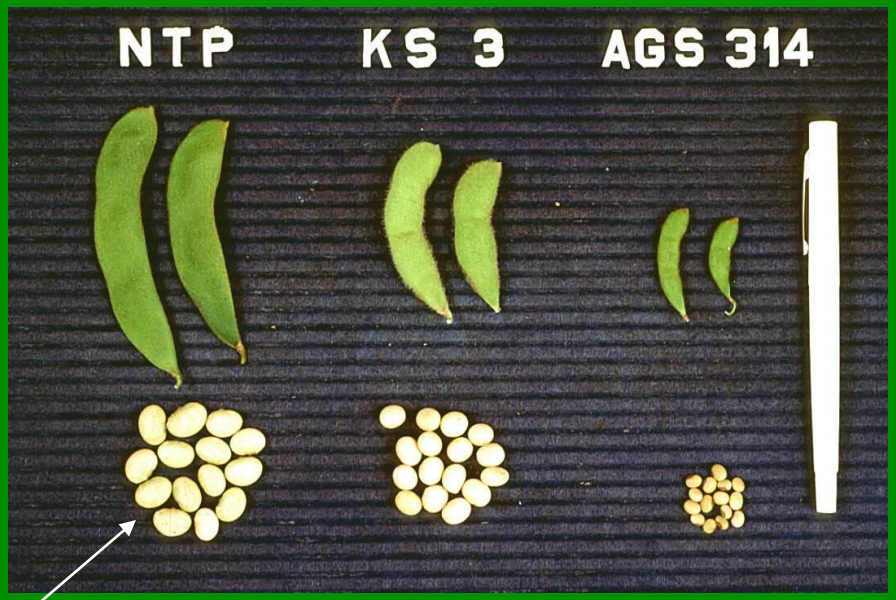
In 1992

By TOP/RTP & KU

Black Seed Tanbaguro
100 seed wt 80 g parent



Neu Ta Pien



100SW 75 g

Neu Ta Pien


KS 3

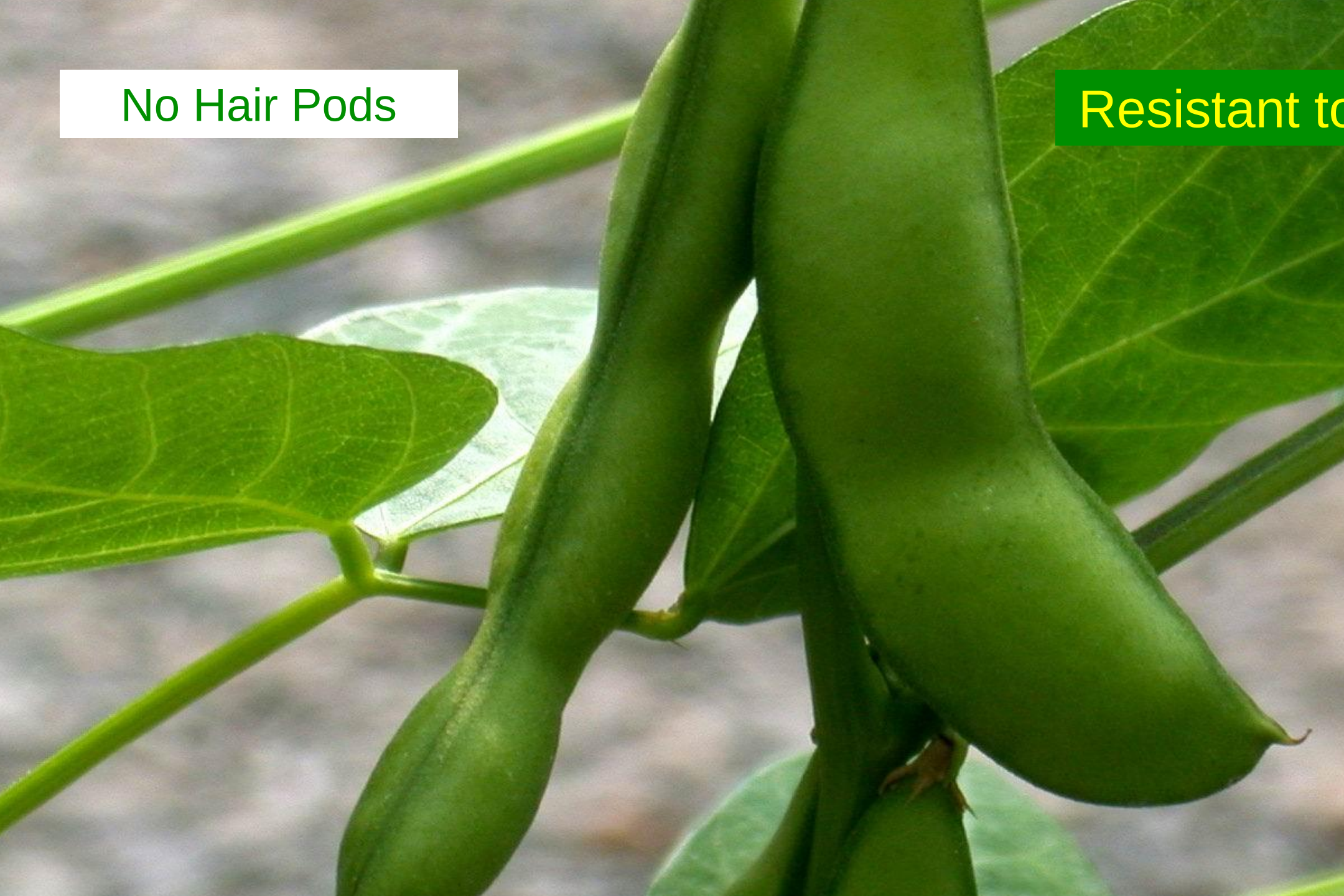
From 1985 – 2006, AVRDC distributed

- AVSET 150
- Breeding lines 3,100
- Germplasm 1,500
- No. of cooperators 420
- No. of countries 60

Yield potential (AGS 292)	12.6 t/ha graded pod 29.0 t/ha total pods
Newer lines	16 t/ha graded pod 30 t/ha total pod

Dada-Cha-Mame

Tanbaguro


No Hair Pods
Resistant to

Vegetable soybean Cultivars Released from AVRDC Materials

- **No. of cultivars released 44**
- **No. of countries 17**
- **Seed can be domestically produced**

AVRDC vegetable soybean released by cooperators as of 2005.

Local name	AVRDC ID	Year	Country
AGATA		2000	Argentina
GC 83005-9	GC 83005-9	1995	Bangladesh
AGS 292	AGS 292	1990	China
	AGS 337	1996	India
MKS 1	AGS 190	1995	Malaysia
VSS 1	AGS 292	1999	Mauritius
VSS 2	AGS 339	1999	Mauritius
	AGS 380		Nepal
Rawal-1	AGS 190	1994	Pakistan
PSB-VS 1	AGS 191	1997	Philippines
PSB-VS 2	AGS 190	1997	Philippines
PSB-VS 3	AGS 186	1997	Philippines
	AGS190	1992	Sri Lanka

AVRDC vegetable soybean released by cooperators as to 2005.

Local name	AVRDC ID	Year	Country
	AGS 292	2002	Sudan
Kaohsiung No. 1	AGS 292	1987	Taiwan
Kaohsiung No. 2	Ryokkoh x KS 8	1991	Taiwan
Kaohsiung No. 3	PI 157424 x KS 8	1991	Taiwan
Kaohsiung No. 6	AGS 292 x Nakadei Kaori	2001	Taiwan
Kaohsiung No. 7	AGS 292 x Tanabagu	2001	Taiwan
Tainan-AVRDC 2	GC94016-10-1	2005	Taiwan
KPS 292	AGS 292	1992	Thailand
CM 1	AGS 190	1995	Thailand
VRQ 46	AGS 346	1999	Vietnam
Mana	AGS 292	1999	Hawaii, USA
Makani	AGS 334	1999	Hawaii, USA

AVRDC vegetable soybean released by cooperators as to 2005.

Local name	AVRDC ID	Year	Country
Momona	AGS 337	1999	Hawaii, USA
Nui	AGS 346	1999	Hawaii, USA
Buker' s Favorite	AGS 292		Oregon, USA
BeSweet 292	AGS 292	2002	Ohio, USA
Koapaka	GC97002 F3	2002	Hawaii, USA
Hiluhilu	GC97022 F3	2002	Hawaii, USA
Kanaloa	GC97002 F3	2002	Hawaii, USA
Kila	GC97022 F3	2002	Hawaii, USA
Onaona	GC97002 F3	2002	Hawaii, USA
Mimiki	GC97022 F3	2002	Hawaii, USA
Palanehu	GC97002 F3	2002	Hawaii, USA
Akua	GC97029 F3	2002	Hawaii, USA
Edamame 1	AGS 292	2006	Zimbabwe

Varieties Released in Hawaii

- Mana(Power)- AGS292
- Makani(Wind)- AGS334
- Momona(Sweet)- AGS337
- Nui(Big)- AGS346
- Koapaka- GC97002 F3*
- HiluHilu- GC97022 F3* +
- Kanaloa- GC97002 F3*
- Kila- GC97022 F3+
- Onaona- GC97002 F3+
- Mimiki- GC97022 F3+
- Palanehu-GC97002 F3
- Akua- GC97029 F3
- *Adapted to Ohio
- +Adapted to South carolina
- Source:- Jim Lothrop 2002

Vegetable Soybean in Mauritius

- 1998 introduced
- Small famers
- Consumers love it
- Cook in various ways
- Market price of pod US$2/kg


'93 3 1


'98 3 1


25 11 2004


งานวันรณรงค์การบริโภค และ ส่งออกถั่วเหลืองฝักสด
ณ เดอะมอลล์ ช้อปปิ้งเซ็นเตอร์ บางบางศ์วาน
18-20 ก.ย.35
ชเสริมรายได้
ริมโปรตีน
ริมพลังงาน
ถั่วเหลือง ฝักสด
5F
4F
3F
2F
1F
GF


'96 1 4


Unique
SOYA CITY
a project of
PLENTY CANADA
10 21 '93

Research Progress

- Vegetable soybean from AVRDC
- High Tocopherol
- Isoflavone yield Diadzein – 250-1575
  Genistein – 575-1559
- Low stachyose & raffinose
- High protein
- High Sucrose- up to 14%

Research Progress

1. Seed quality related to seasonal effect
2. Triple null for lypoxygenase – Less Beany Flavor
3. Vegetable soybeans for the world – AVRDC
4. Diverse product development

Current Research

- Large seed size (slide)
- Narrow leaflet
  (High % of 2 and 3 seed pods)
- Lipoxygenase nulls (No. beany flavor)
- Glabrous leaf & pod (pod borer resist.)
- Taro flavor (special flavor)
- Sweet taste (14% sugar)
- Rich functional nutrients (Isoflavones, tocopherol, folic acid)

Seven brown seeded basmati flavor vegetable soybean

AGS no. or line	Season	Graded pod Yield (t/ha)	Days to harvest	2-seed-pod (cm)		100 bean wt. (g)	Graded pod ratio (%)
				pod length	pod width		
AGS456	spring	5.6	71	5.8	1.5	75.7	55.1
	autumn	6.2	69	5.6	1.5	80.1	58.6
AGS457	spring	8.7	82	5.1	1.4	70.1	64.0
	autumn	4.9	70	5.0	1.4	62.0	52.7
AGS458	spring	8.98	85	5.1	1.4	73.0	65.1
	autumn	5.85	65	5.0	1.4	60.1	63.2
AGS461	spring	7.4	85	5.2	1.5	83.6	55.2
	autumn	3.5	66	4.9	1.5	70.3	34.0
GC02006-8-1-2-1	spring	9.5	85	5.1	1.4	70.0	70.0
	autumn	9.5	66	5.1	1.4	74.4	79.4
GC 02012-285BR	spring	12.4	84	5.4	1.4	84.8	53.01
	autumn	11.1	70	4.8	1.4	75.8	66.28
GC 02012-284	spring	12.3	76	5.3	1.5	87.2	56.06
	autumn	7.6	66	4.9	1.3	72.0	50.79

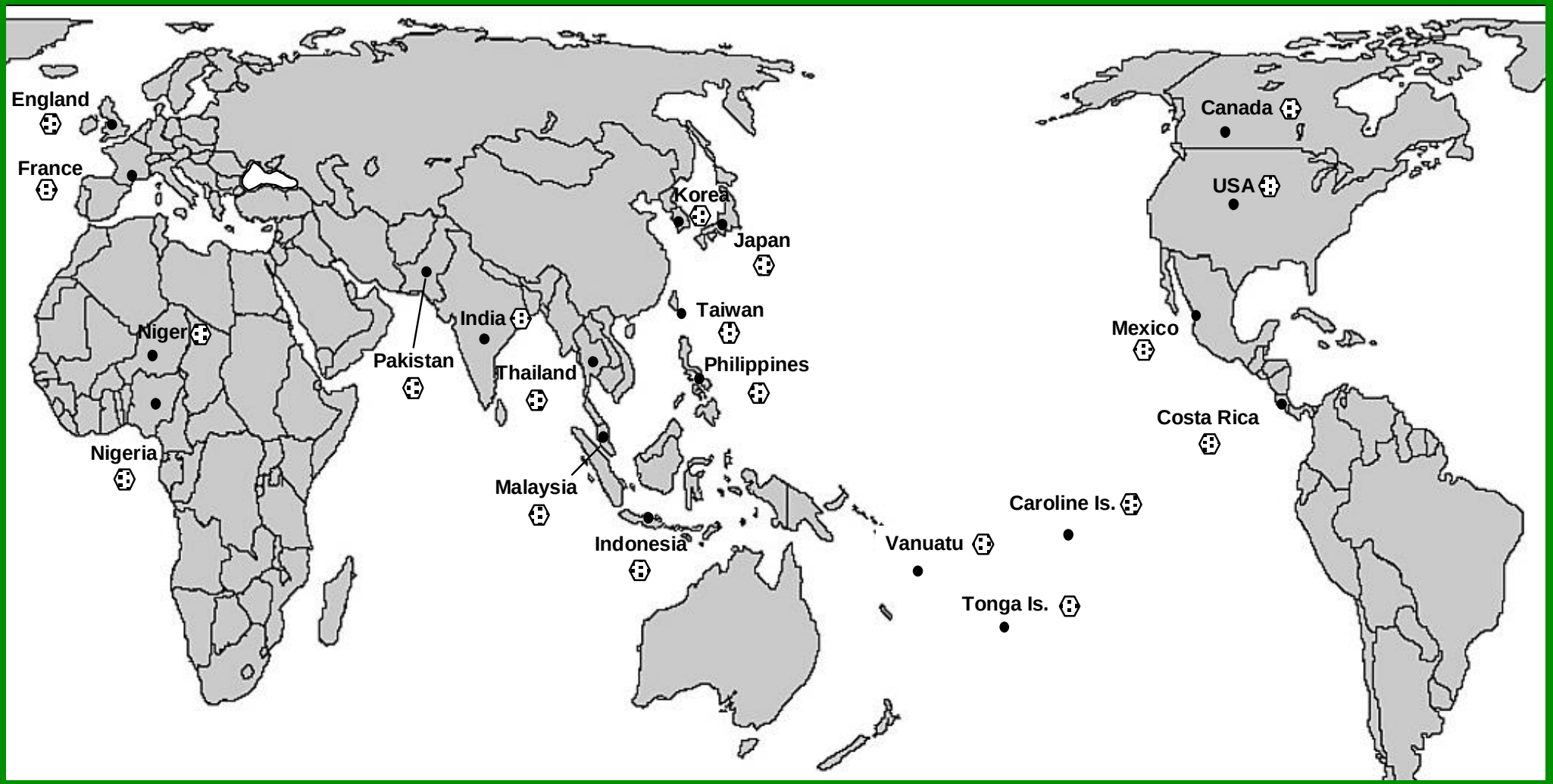
Seven black seeded basmati flavor vegetable soybean

AGS no. or line	Season	Graded pod Yield (t/ha)	Days to harvest	2-seed-pod (cm)		100 bean wt. (g)	Graded pod ratio (%)
				pod length	pod width		
AGS459	spring	7.2	86	5.1	1.4	68.4	54.5
	autumn	5.3	70	4.9	1.4	76.2	39.2
AGS460	spring	8.6	89	5.3	1.5	81.3	59.2
	autumn	6.1	73	4.9	1.5	84.3	39.4
GC02008-46-2-1-1	spring	9.1	85	5.5	1.4	85.5	68.6
	autumn	7.0	65	5.3	1.4	90.7	59.4

Seven light-green seeded basmati flavor vegetable soybean

AGS no. or line	Season	Graded pod Yield (t/ha)	Days to harvest	2-seed-pod (cm)		100 bean wt. (g)	Graded pod ratio (%)
				pod length	pod width		
GC01119-T31-1-1	spring	9.2	83	5.5	1.4	81.0	65.9
	autumn	5.6	70	5.4	1.4	76.1	61.3
GC01119-99-2-1-1-1	spring	9.7	83	5.9	1.5	70.0	75.3
	autumn	10.9	70	5.9	1.5	70.6	78.1
GC01119-T31-4-1	spring	8.2	82	5.2	1.4	82.3	59.6
	autumn	4.9	70	5.3	1.4	76.0	57.1
GC02006-112-1-1	spring	10.3	85	6.0	1.5	81.5	47.40
	autumn	15.3	72	5.5	1.5	83.6	75.87
GC02006-112-2-1	spring	10.6	85	5.8	1.4	77.7	47.96
	autumn	13.5	72	5.3	1.5	77.1	73.49
GC02008-227-1	spring	10.5	78	6.0	1.4	79.6	57.99
	autumn	12.1	66	5.6	1.3	74.1	70.77
GC01105-196-1	spring	10.4	83	5.9	1.4	94.7	52.90
	autumn	16.0	70	5.7	1.3	67.3	79.07

Progress in evaluation and release of AVRDC vegetable soybean 1979-1983



AVRDC Vegetable Soybeans:

Evaluation, commercial production and export in the world as of 2009.

Alternate strategies

- Mature Grain Seed Production
- Marketing as Seeds
- Processing the Seed
- Fried Seeds/salted/spiced
- Chocolate coated seeds
- Product diversification

SEED PRODUCTION


Seed Production


Good Quality Seed


Proper Storage
Cool Dry Place

- **Can also be sold as mature seed**

Grain soybean	US$0.25/kg
Vegetable soybean	US$3-4/kg
In the USA	US$8-12/lb
In Japan	US$35-40/kg

Training& Capacity Building

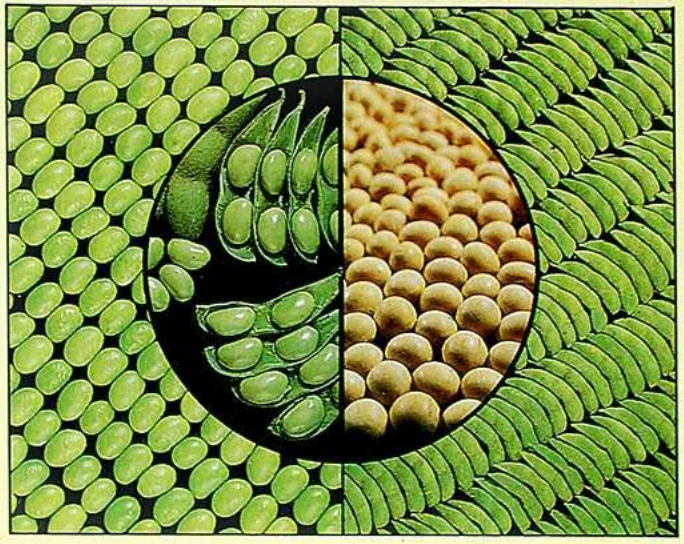
- WHO?
  - -Farmers
  - -Seed Producers
  - -Extension People
  - -Middlemen
  - -Plant Protection Staffs

Training &Capacity Building

- WHERE?
  - -International Centers
  - -National Institutions
  - -Agri. Universities
  - -Private Companies
  - -Regional Organizations
  - -NGOs

Vegetable Soybean

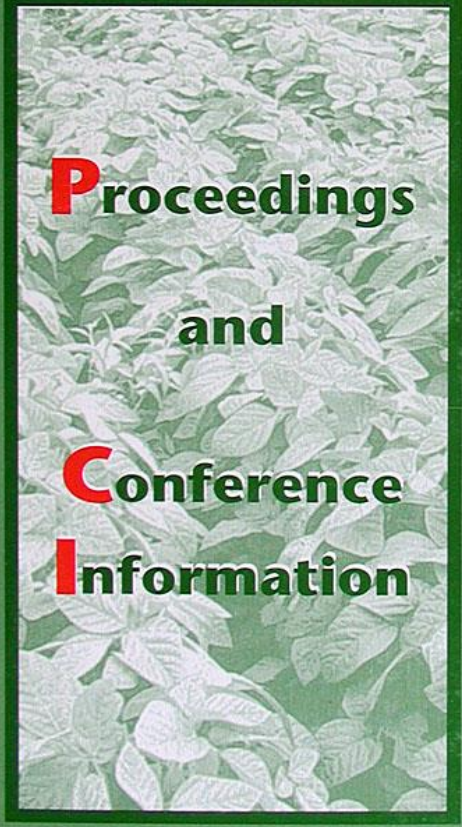
Research Needs for Production and Quality Improvement



Council of Agriculture, Republic of China
Provincial Department of Agriculture and Forestry, Taiwan
Asian Vegetable Research and Development Center

Second International Vegetable Soybean Conference

枝豆 毛豆



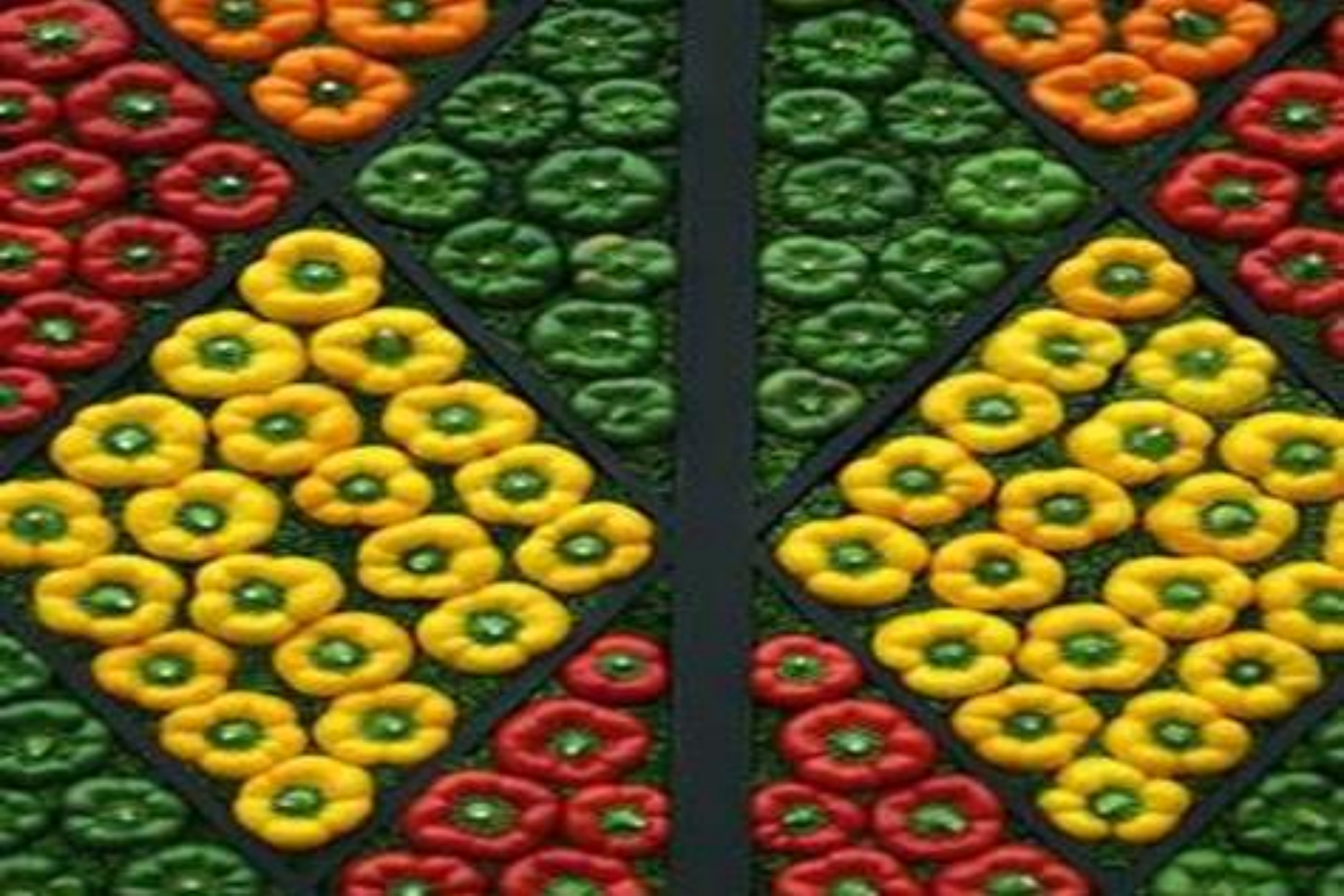
August 10–12, 2001
Tacoma, Washington
USA

SPECIAL THANKS TO OUR SPONSORS
Asian Vegetable Research and Development Center
U.S. Department of Agriculture
Washington State University IMPACT Center
CFAO, Asia Foods Group
Small Planet Foods
Taiwan Council of Agriculture
American Takii
Whole Soy Company

WASHINGTON STATE UNIVERSITY
World Class. Face to Face.

Vegetable Soybean

- Short growth duration
- Fits well in different cropping systems
- Can serve as multipurpose crop
- Can provide additional income to poor farmers
- Can promote rural employment
- Can sustain soil productivity
- Can improve human nutrition



MARKETING

Area & Production

Country	Area(ha)	Production(t)	Year	Reference
China	284,000	1,704,000	2003	Wu (2004)
Japan	13,300	72,500	2009	MAFF (2009-11)
Taiwan	7,153	51,339	2010	COA, 2011
Thailand	3,200	20,000	2007	S. Daruphan (Chiang Mai, Thailand, 2008, personal communication)
Indonesia	1,000	6,250	2010	Mitratani Dua Tujuh,2011 (Personal communicatioon)
Vietnam	140	700	2006	TFVMA (2008, personal communication)
[a]TFVMA: Taiwan Frozen Vegetable Manufacturer's Association, Kaohsiung, Taiwan				

Vegetable Soybean Export to Japan

Country	2005			2006		
	Quantity (t)	Price (US$/kg)	Total Value (million US$)	Quantity (t)	Price (US$/kg)	Total Value (million US$)
China	31,086	1.25	38.73	29,702	1.38	40.99
Taiwan	23,572	1.66	39.27	22,198	1.77	39.29
Thailand	10,960	1.52	16.59	11,161	1.65	18.41
Indonesia	2,936	1.43	4.18	3,117	1.48	4.61
Vietnam	664	1.44	0.94	698	1.46	1.00
Total	69,218	1.44	99.71	66,876	1.54	104.30


Growing for Gold

VALUE CHAIN

- CONSUMER PRODUCT DIVERSIFICATION

How to cook the whole pod or shelled bean?

Wash pods

Boil water with salt

Add pods to boiling water

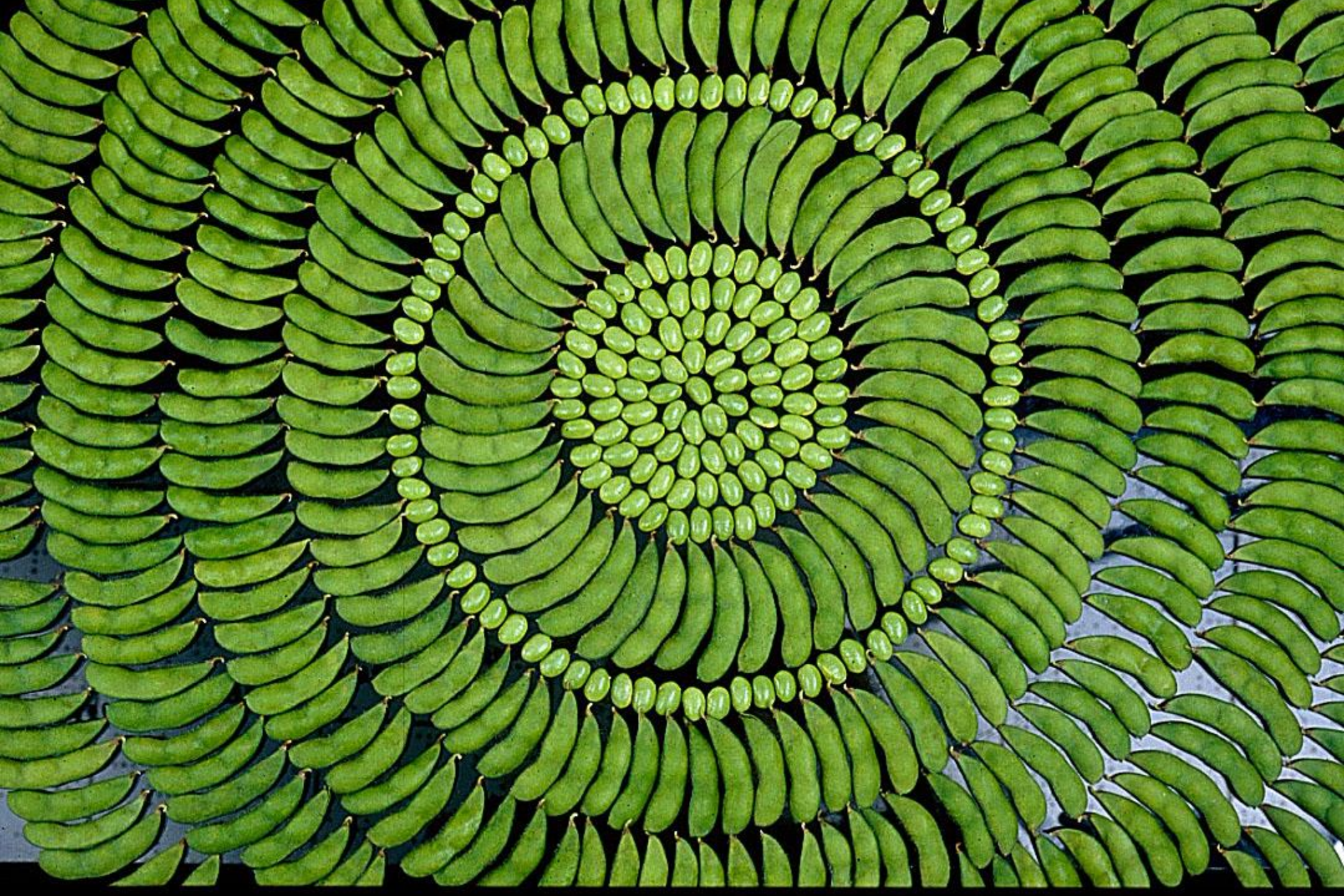
Continue boil for 6 minutes

Remove from fire and drain water immediately

Beans in the pod are ready to eat

- **Whole pod not edible**
- **Only green beans inside the shell edible**
- **Similar to boiled peanuts**

- **Shelled beans boil with salt for 5 minutes (Ready to eat)**
- **Cook with other vegetables or meats (As a side dish)**




岐阜特産
岐阜県経済連
岐阜特産
岐阜県経済連


冷凍食品
Fast Pack
ファスト
パック
業務用
枝豆
green soy beans
内容量1kg


SOY BEANS
—ライフの冷凍食品—
まめ 鶴の子
冷凍食品
マルちゃん
えだ豆
特選
えだまめ"特選"大粒で、緑が鮮やか、味にコクがあります。
内容量 500g
TS TOYO SUISAN
あけぼの
枝豆
冷凍食品
500g
要冷凍
SOY BEANS
—ライフの冷凍食品—
だまめ 鶴の子
Life Foods
SOY BEANS
—ライフの冷凍食品—
えだまめ 鶴の子
Life Foods
SOY BEANS
—ライフの冷凍食品—
えだまめ 鶴の子
SOY BE
—ライフの冷
えだまめ

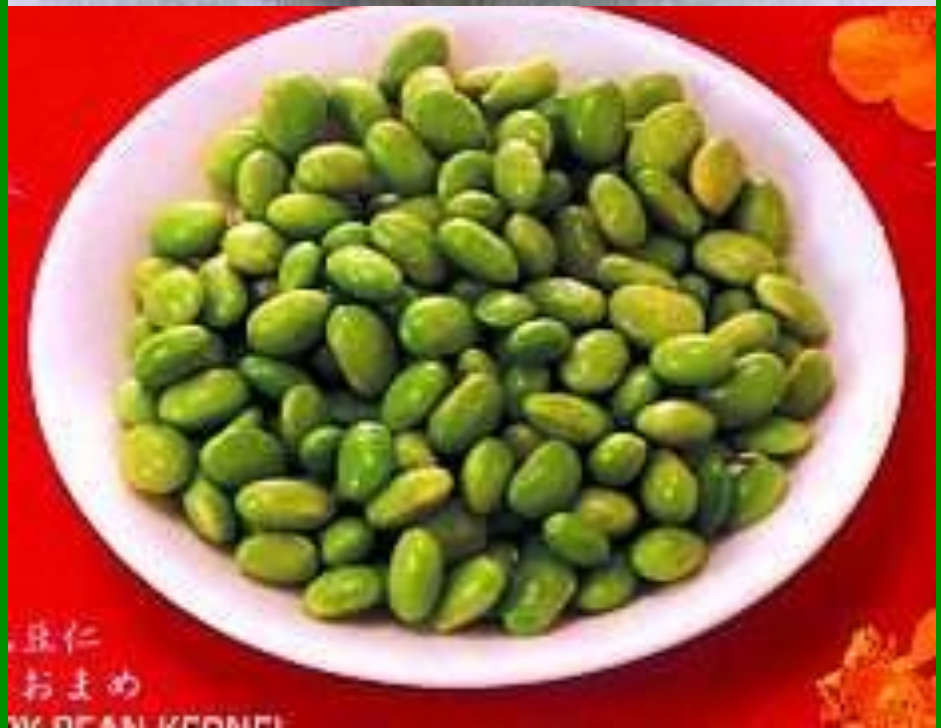

AGS 292


'21 7 19

เมล็ดถั่วเหลืองฝักสด


Cabbage koottu


冷凍七豆
えだまめ
FROZEN SOY BEAN



Cooked with Various Ingredients

Frozen Green Soybean Salted

Frozen Green Soybean with Pepper

Frozen Green Soybean with Garlic

Frozen Green Soybean with Spices


HANOVER®
THE GOLD LINE®
PREMIUM
Edamame In The Pod
SOYBEANS IN THE SHELL
Steam in Bag
Serving suggestion
KEEP FROZEN
NET WT. 12 oz (340g)
HANOVER Edamame In The Pod


SELECO
FLAVOURED CRISPY JAPANESE GREEN SOYBEA
ถั่วแระกรอบปรุงรส
えだまめ
NO AFLATOXI
HIGH VITAMIN A
LOW FA
น้ำหนักสุทธิ 10 กรัม
Net.Wt. 10 g.


TRADER JOE'S®
Dry Roasted Edamame

Roasted vegetable soybean


0%
20%
40%
60%


Blanched Vegetable Soybean
Soybean
Blanched Vegetable Soybean


大豆豆腐

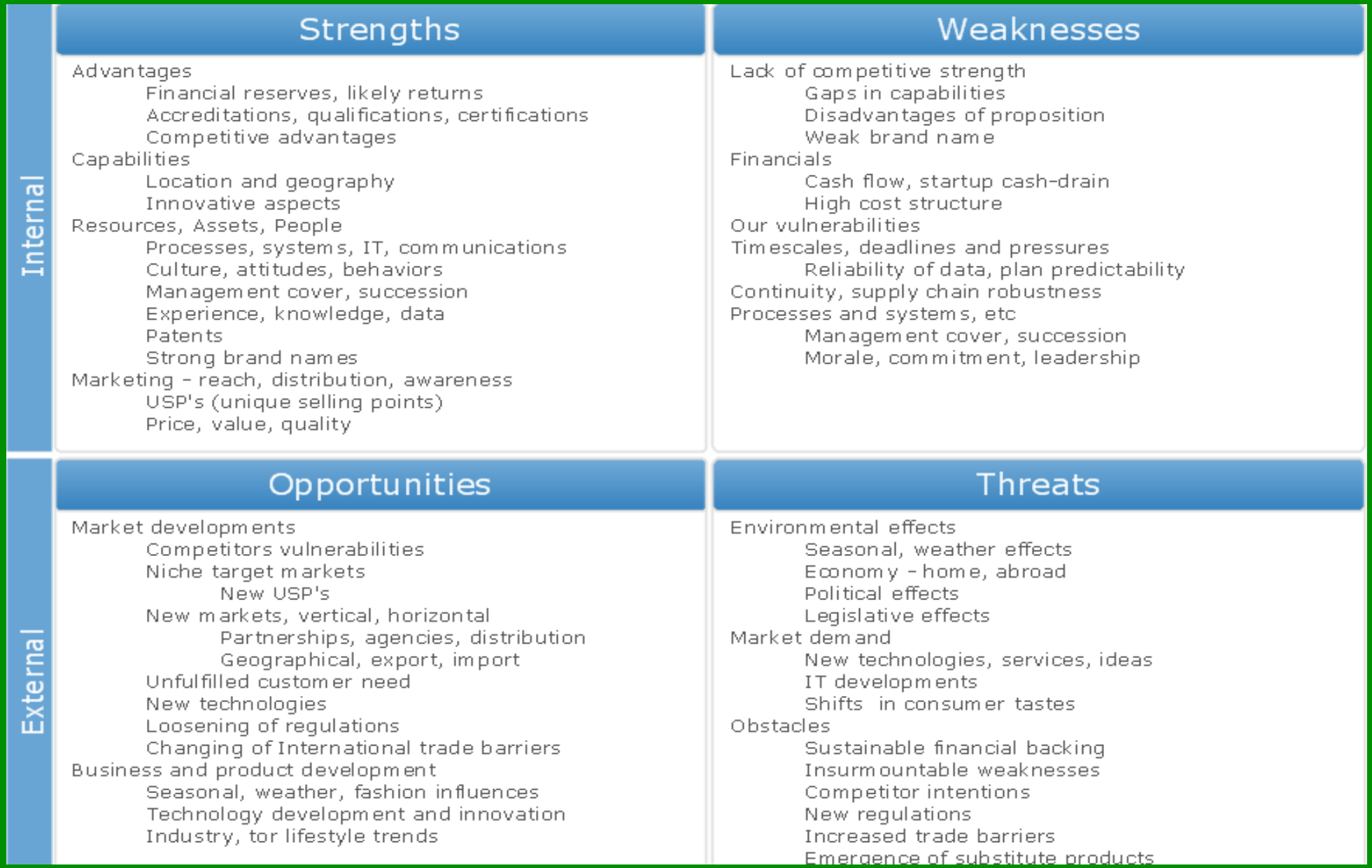

毛豆豆腐

Green Soybean Pudding

Green Soybean Ice Cream

Green Soybean Ice Bar


Strengths
Weaknesses
SWOT Analysis
Opportunities
Threats


Internal
Strengths
Advantages
Financial reserves, likely returns
Accreditations, qualifications, certifications
Competitive advantages
Capabilities
Location and geography
Innovative aspects
Resources, Assets, People
Processes, systems, IT, communications
Culture, attitudes, behaviors
Management cover, succession
Experience, knowledge, data
Patents
Strong brand names
Marketing – reach, distribution, awareness
USP's (unique selling points)
Price, value, quality
Weaknesses
Lack of competitive strength
Gaps in capabilities
Disadvantages of proposition
Weak brand name
Financials
Cash flow, startup cash-drain
High cost structure
Our vulnerabilities
Timescales, deadlines and pressures
Reliability of data, plan predictability
Continuity, supply chain robustness
Processes and systems, etc
Management cover, succession
Morale, commitment, leadership
External
Opportunities
Market developments
Competitors vulnerabilities
Niche target markets
New USP's
New markets, vertical, horizontal
Partnerships, agencies, distribution
Geographical, export, import
Unfulfilled customer need
New technologies
Loosening of regulations
Changing of International trade barriers
Business and product development
Seasonal, weather, fashion influences
Technology development and innovation
Industry, tor lifestyle trends
Threats
Environmental effects
Seasonal, weather effects
Economy – home, abroad
Political effects
Legislative effects
Market demand
New technologies, services, ideas
IT developments
Shifts in consumer tastes
Obstacles
Sustainable financial backing
Insurmountable weaknesses
Competitor intentions
New regulations
Increased trade barriers
Emergence of substitute products

Internal	✓ Your specialist marketing expertise. ✓ A new, innovative product or service. ✓ Location of your business. ✓ Quality processes and procedures. ✓ Any other aspect of your business that adds value to your product or service.	✓ Lack of marketing expertise. ✓ Undifferentiated products or services (i.e. in relation to your competitors). ✓ Location of your business. ✓ Poor quality goods or services. ✓ Damaged reputation.
External	**Opportunities**	**Threats**
	✓ A developing market such as the Internet. ✓ Mergers, joint ventures or strategic alliances. ✓ Moving into new market segments that offer improved profits. ✓ A new international market. ✓ A market vacated by an ineffective	✓ A new competitor in your home market. ✓ Price wars with competitors. ✓ A competitor has a new, innovative product or service. ✓ Competitors have superior access to channels of distribution. ✓ Taxation is introduced on your

- STRENGTHS
- Vegetable soybean has been successfully cultivated in Cedara by selected farmers and several community gardeners
- Research has identified promising, high yielding vegetable soybean varieties
- Climatic conditions in eThekwini are suitable for growing at least two crops of vegetable soybean a year
- The Department of Agriculture has the technical expertise to deal with agronomical problems.
- The Municipality is supportive of agricultural projects and is committed to invest in assisting rural poor communities.
- Existing community gardeners have successfully grown and used vegetable soybeans
- The provincial department of agriculture has the capacity to implement and support this project.
- Community gardeners are currently aware of the nutritional benefits of vegetable soybeans
- Vegetable soybeans have short growth duration of 75 to 90 days from sowing to harvest.
- Vegetable soybeans are profitable to the farmers
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- WEAKNESSES
- Vegetable soybean is anew crop to most of the farmers and community gardeners
- No improved vegetable soybean has been officially released for farmer cultivation in EThekwini and KZNL
- Official program on vegetable soybean is yet to be organized with the Department of Agriculture and Agricultural Extension in EThekwini and KZNL
- Vegetable soybean seed deteriorates rapidly and therefore, a seed production, storage and distribution mechanism need to be developed
- The green pods are perishable and they should be marketed within a short time
- The logistics involved in harvesting, processing and marketing are yet to be streamlined
- Customers are not aware of the vegetable soybean and its nutritional and health benefits
- International market is uncertain and there is no experience in dealing with such markets
- Returns from agricultural products are generally lower than other sectors
- There are other competitors such as SunOpta for soymilk from grain soybean which is cheaper than soymilk from vegetable soybean
- Climate change, pests and diseases are risk factors, which are more for vegetable soybean than other non-agricultural sectors.

- OPPORTUNITIES
- Vegetable soybean is a short growth duration crop and farmers may be willing to take the risk
- The profit margin from vegetable soybean-both as a green vegetable and as a seed for planting purposes- is much greater than the grain soybean
- Vegetable soybean is an exciting crop with attractive health and nutritional benefits and may be easy to convince the consumers and establish the market
- Once the farmers have gained experience and the consumers are convinced the market can be sustained. There is potential for domestic and international market expansion.
- There is an opportunity to improve the nutrition and health of the young school children and a productive future generation
- Vegetable soybean can be easily incorporated in the existing community gardens
- Since vegetable soybean is a legume it can fix atmospheric nitrogen through the symbiotic rihizobium and enrich the soil
- Export opportunity will be encouraged due to close proximity of the Dube Trade Port.
- Vegetable soybean can encourage a balanced animal and plant protein and vitamins and plant fibers
- Vegetable soybean can help generate more job opportunities and income generation
- Value added products can be generated from vegetable soybean
-

- THREATS
- Adoption of new crop and technology by farmers will be generally slow
- Untimely fund distribution may adversely affect the trust of the farmers and the community
- Adverse climatic conditions and unexpected pests and diseases may discourage the farmers
- Lack of funding support may delay the project
- If vegetable soybean is imported from China it will be a strong competitor for domestically produced vegetable soybean
- Lack of community buy-in.
- Timely import of necessary processing equipments.
- Ensuring the proper sanitation and quality of the product.
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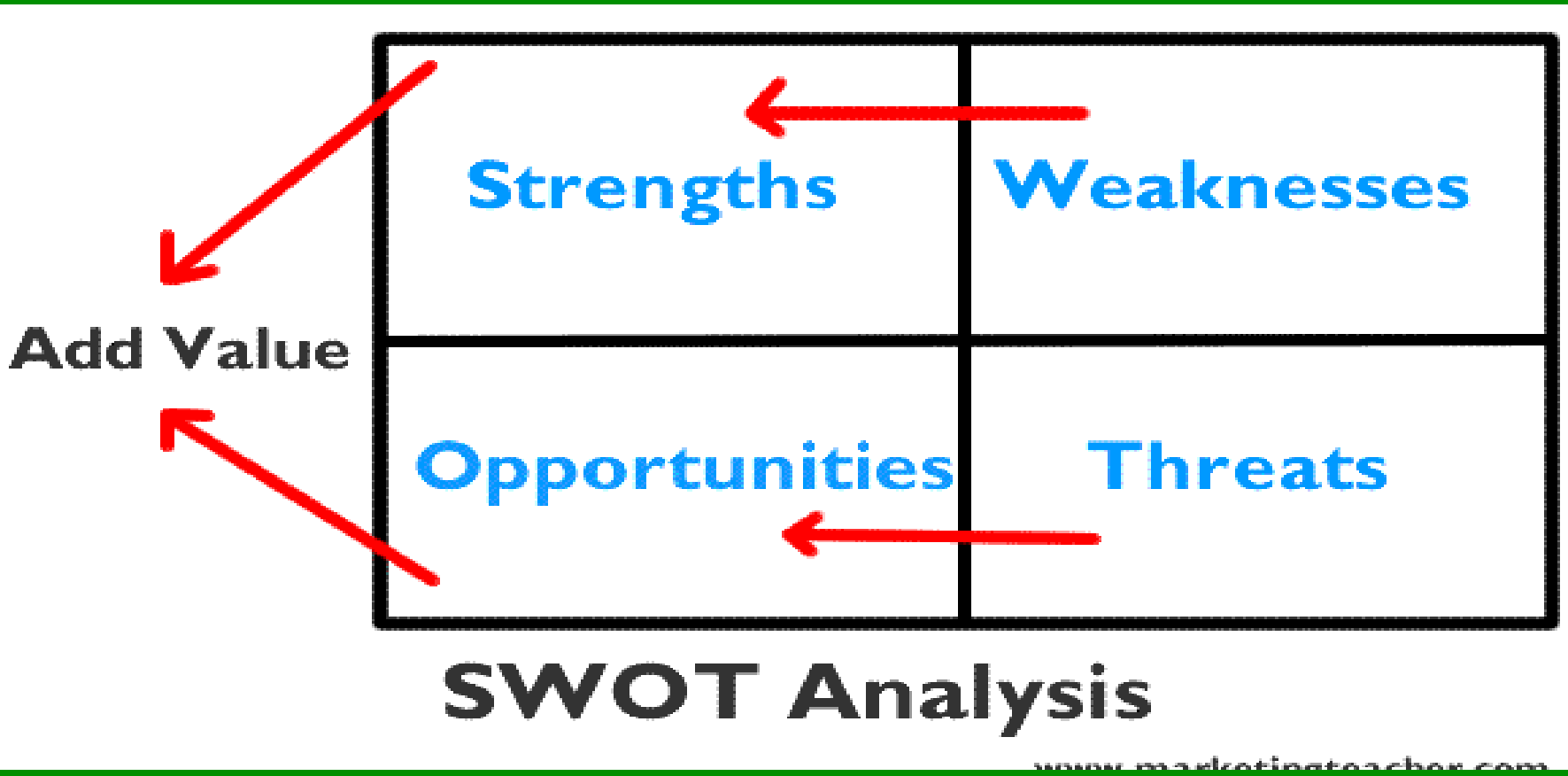
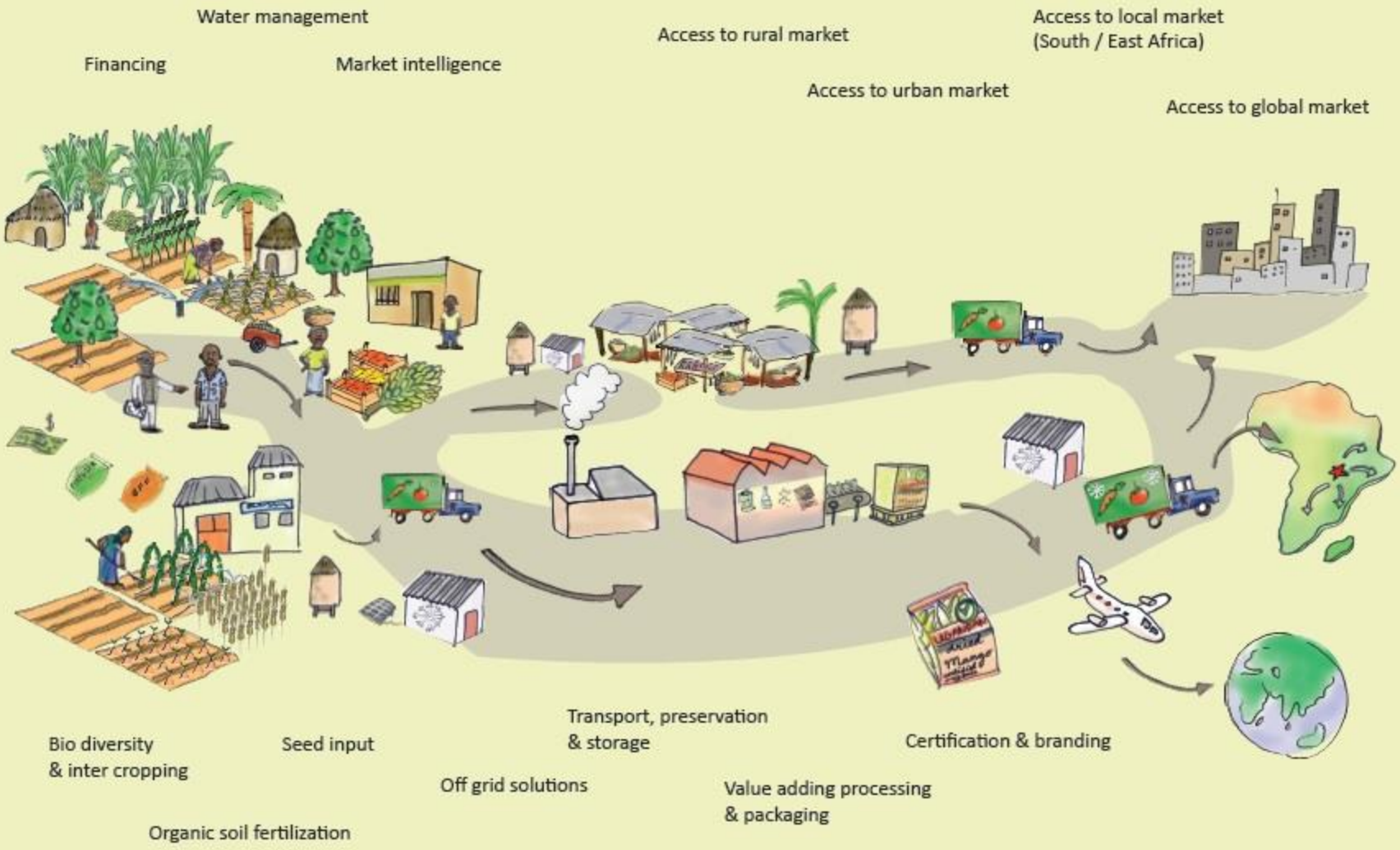
Value Addition



Value Chain Mapping



Marketing Vegetable Soybean in Nepal

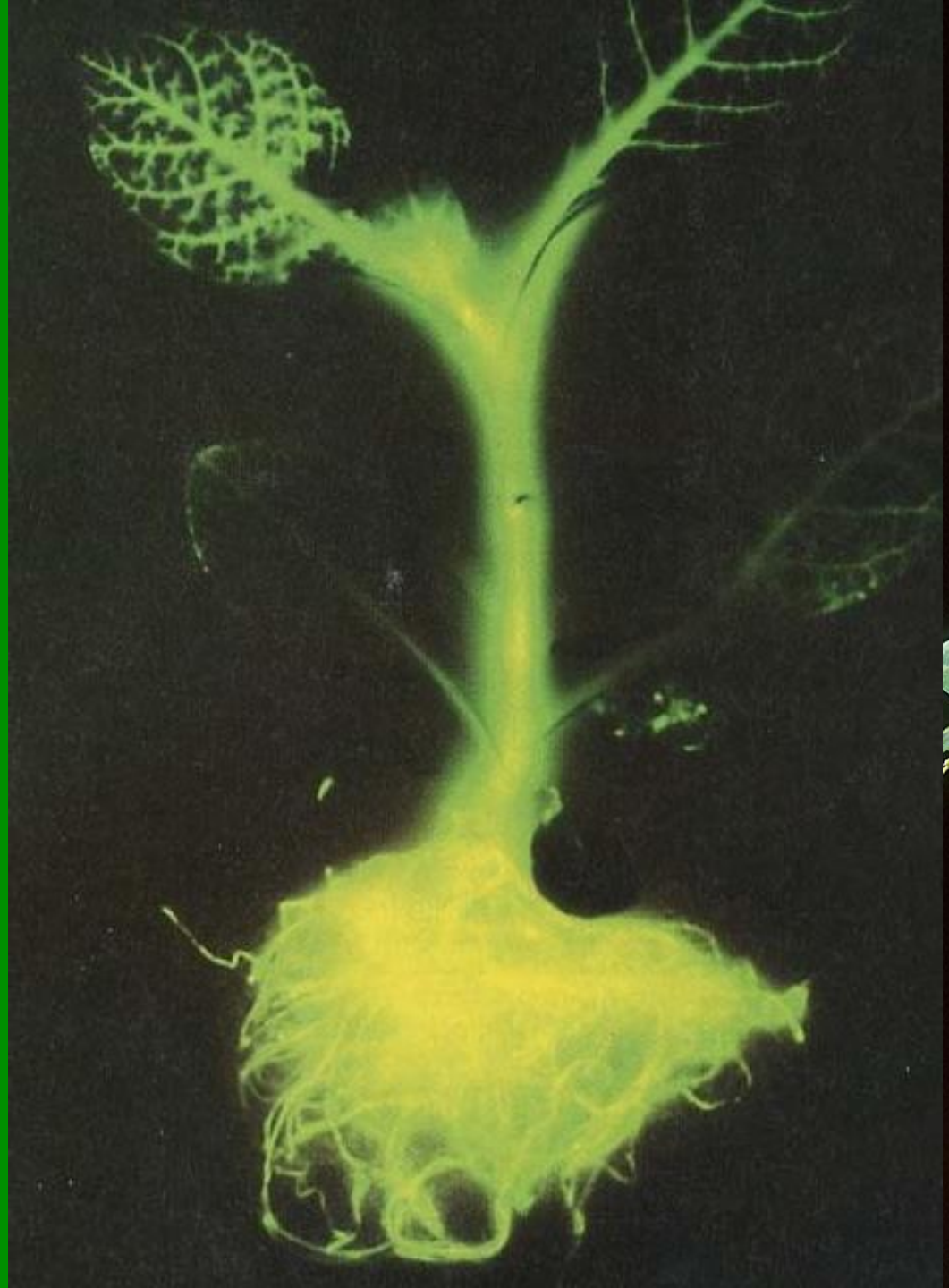
SRTT Project in India- “Swarna Vasundara”

Source:DFID Report2012


SVAMP-
SKOLANS
SVAMP-
SKOLANS
15:-
10:-
5:-
Välkommen
till vår klubb!

CONCLUSION

INTEGRATE **SUPPLY & VALUE CHAINS** TO HAVE CONCURRENT FLOWS OF VALUE AND SUPPLY FOR THE RAPIDLY SHIFTING TASTES, PREFERENCE AND DEMAND OF CUSTOMERS

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