

Chickpea Production in India



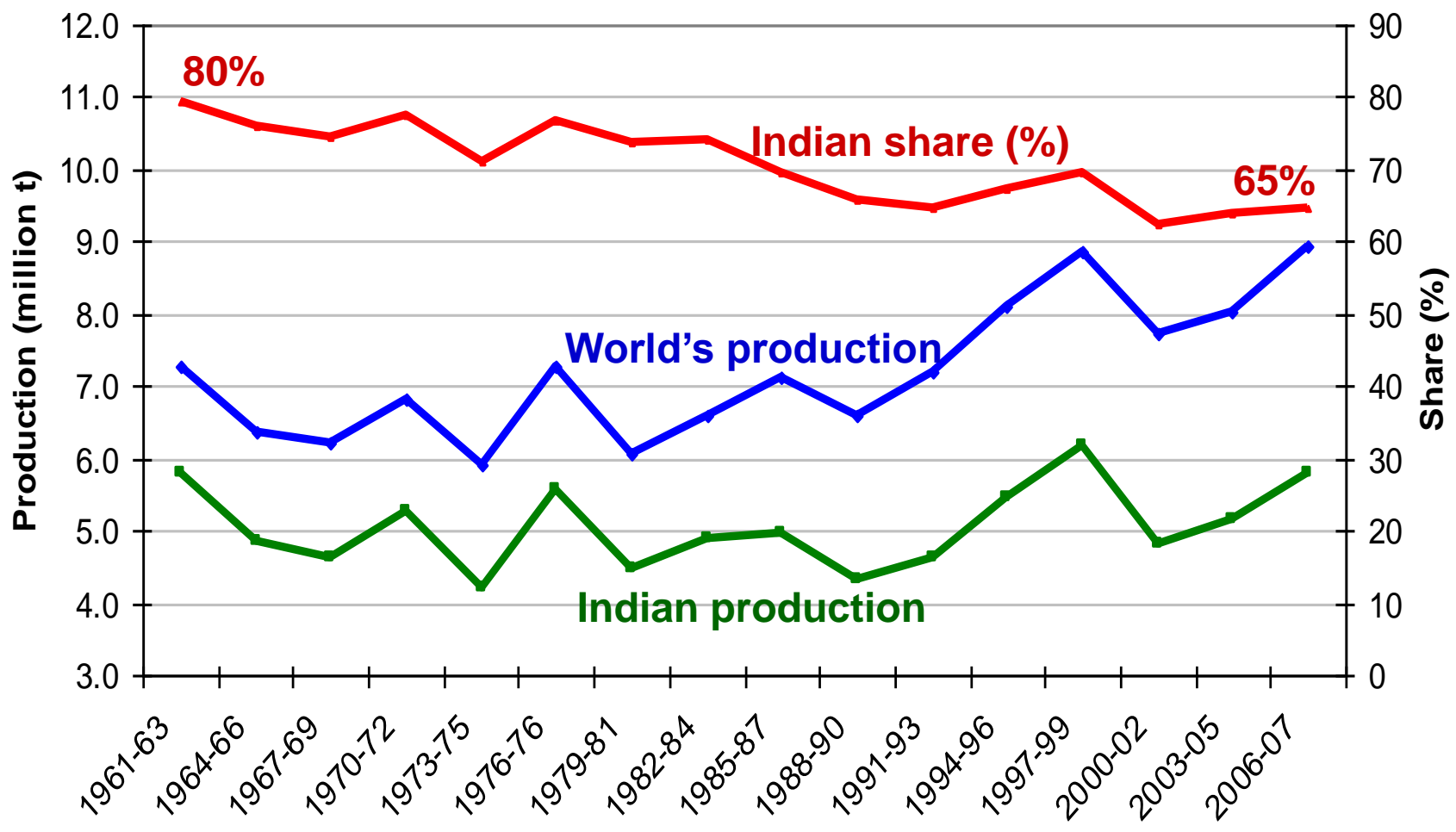
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Paper presented during the Chickpea Training cum Workshop for Cordilleras. NPRTC, Benguet State University, La Trinidad, Benguet, Philippines. February 24-26, 2010.

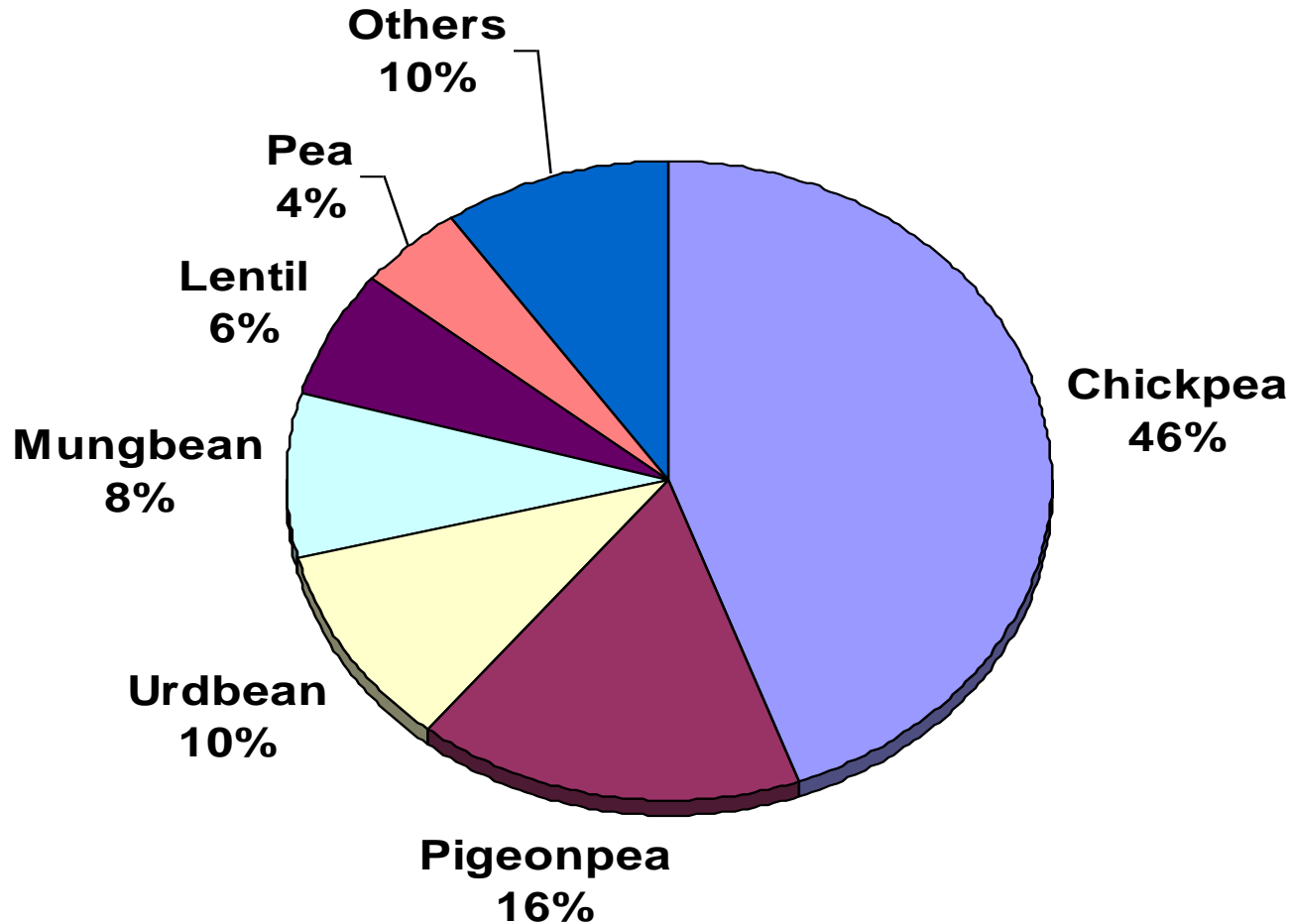
Chickpea (*Cicer arietinum* L.), a cool season crop, is the largest produced food legume in South Asia and the third largest globally, after common bean and field pea.

- Chickpea is grown as winter crop (tropics) and as summer or spring crop (temperate environments).
- Grown in more than 50 countries (89.7% in Asia; 4.3% in Africa; 2.6% in Oceania; 2.9% in Americas; and 0.4% in Europe).
- India is the largest chickpea producer with 65% of global production.
- Other major producing countries: Pakistan, Turkey, Iran, Myanmar, Australia, Ethiopia, Canada, Mexico, and Iraq.
- Important source of protein (20-22%) in South Asia who are largely vegetarians. Rich in fiber, minerals, *B*-carotene, and lipid fraction is high in unsaturated fatty acids.
- Improves soil fertility by fixing atmospheric N up to 140 kg/ha.
- Average global productivity 700-800 kg/ha.

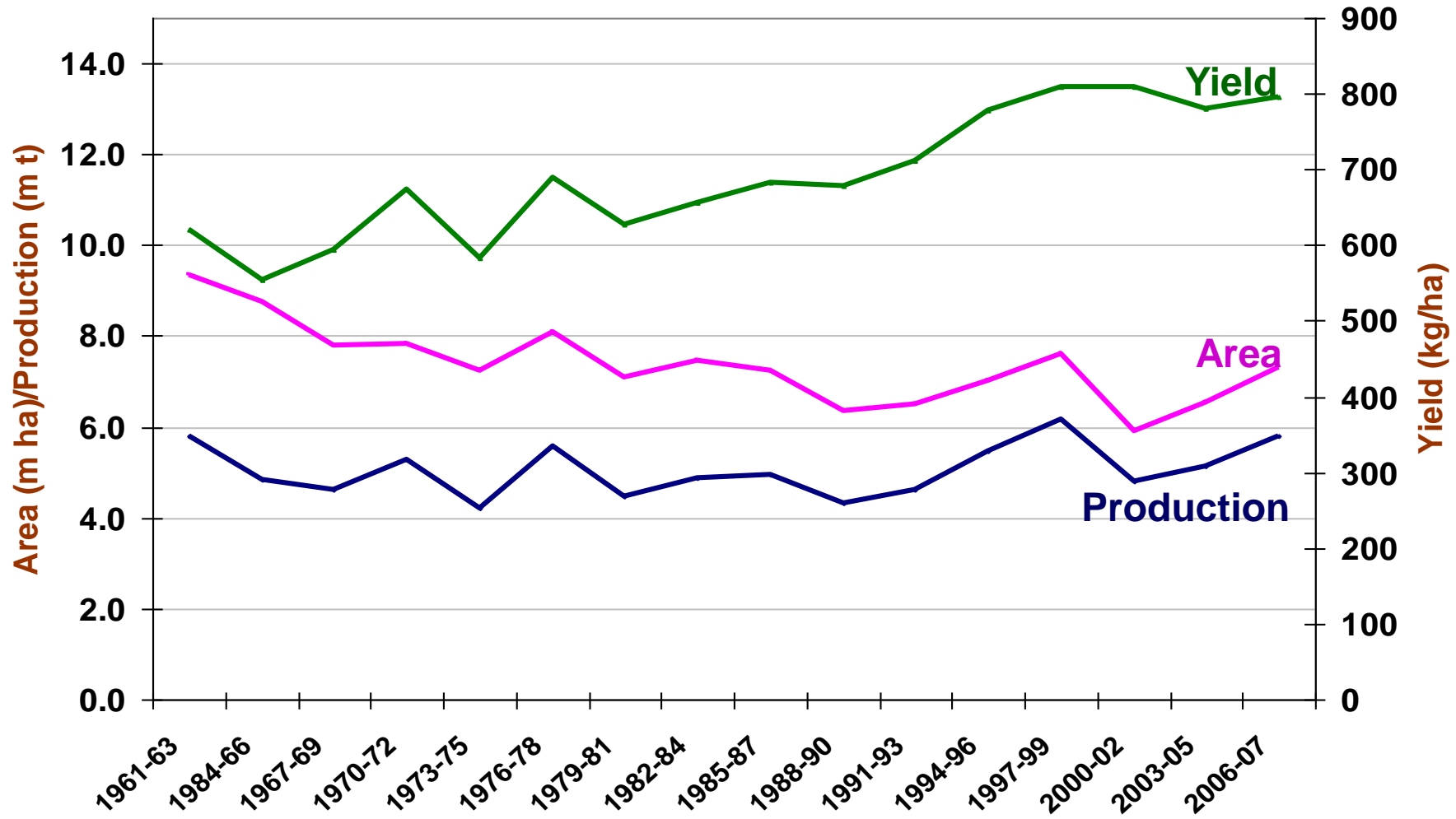
**Chickpea Production in India and the World
and Indian Share in Global Chickpea Production**



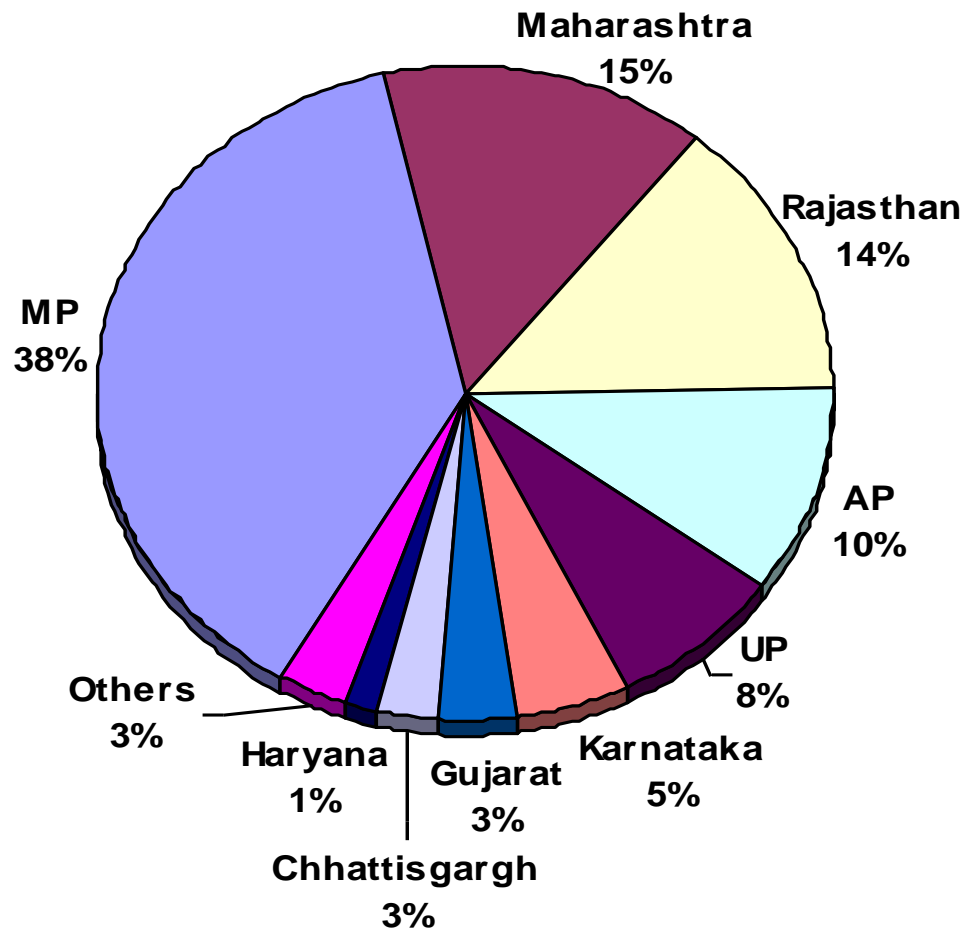
Indian pulse production: Share of different pulses



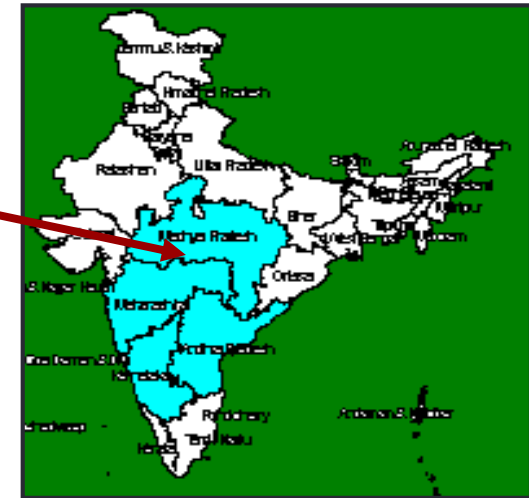
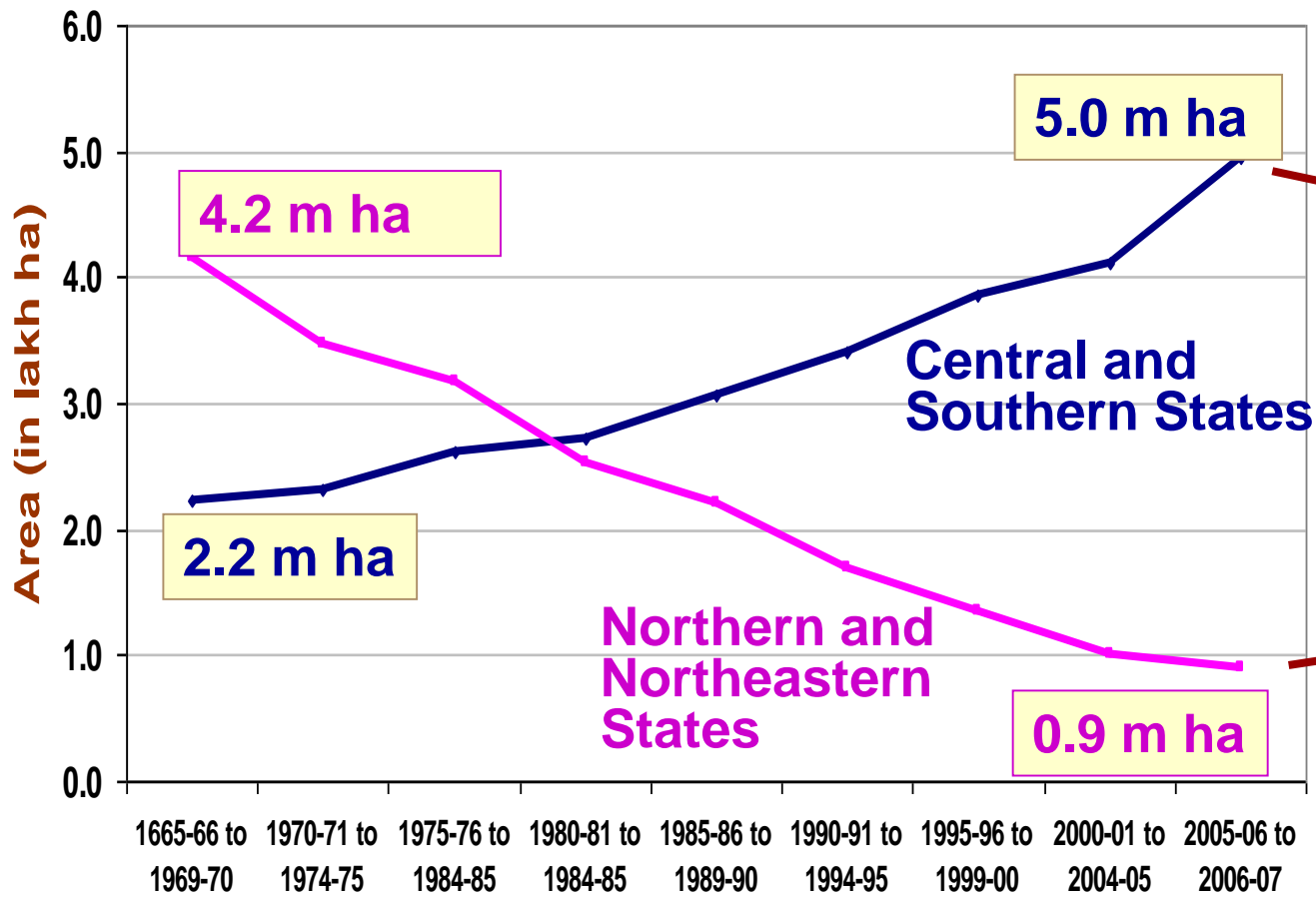
Trends in area, production and yield of chickpea in India



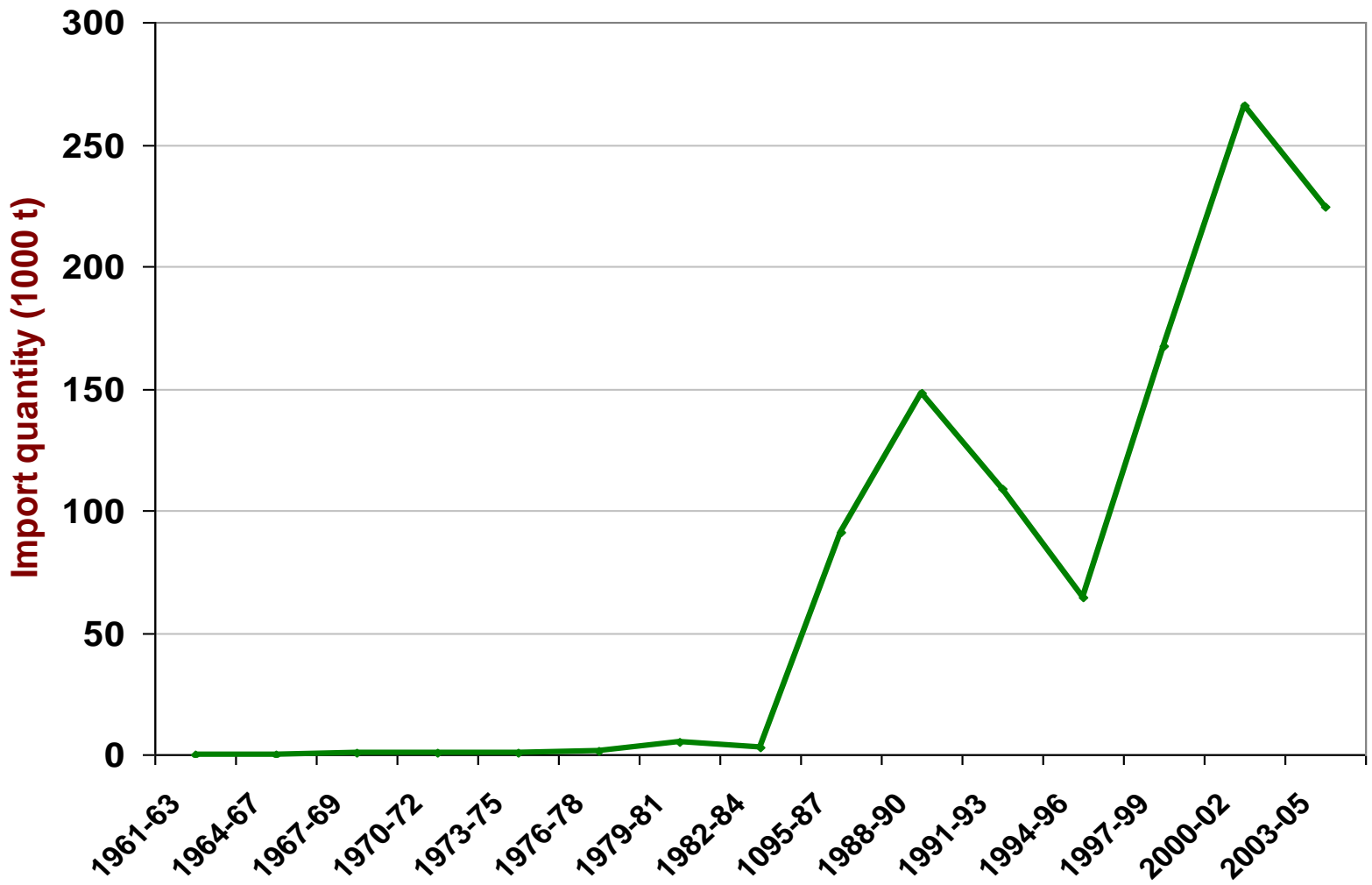
Share of different states in Indian chickpea production



Shift in chickpea area from Northern and Northeastern India to Central and Southern India



India imports chickpea



Cultivars preferred by farmers in India

Desi type

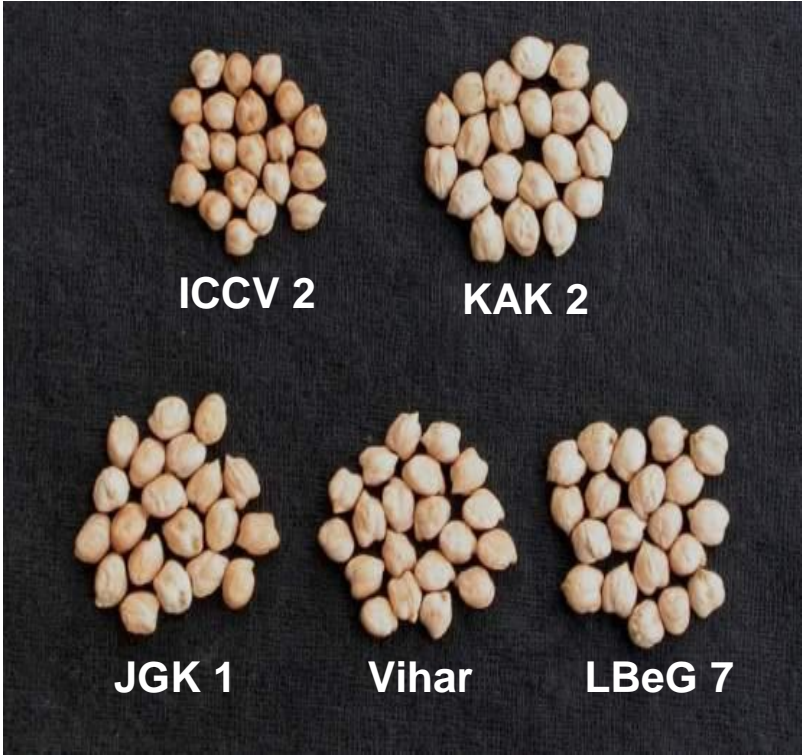


Cultivar	Year of release	Days to maturity	100-seed weight (g)
ICCC 37	1989	90-95	20-22
JG 11	1999	90-100	20-22
JG 130	2000	100-110	25-27
JAKI 9218	2006	95-105	22-25

Cultivars preferred by farmers in India

Kabuli type

Cultivar	Year of release	Days to maturity	100-seed weight (g)
ICCV 2	1989	85-90	24-26
KAK 2	1999	90-100	34-38
JGK 1	2002	95-105	32-34
Vihar	2002	100-110	32-34
LBeG 7	2006	95-105	32-34



DOs in Chickpea production

Selection of varieties



Desi

size: 16-20 g/100 seeds

Kabuli

size: 34-40 g/100 seeds

DOs in Chickpea production

Field selection

- **Fine-textured black soil**
- **pH = 6.0 to 9.0**
- **Do not use fields with problem of water logging**
- **Do not use saline soils**
- **Remove stubble and debris before sowing**

DOs in Chickpea production

Nutrient management

kg per ha

Nitrogen : 20

Phosphorus : 40

If deficient

Potash : 20

Sulphur : 20

Zinc : 5

Boron : 2

Molybdenum : 1

DOs in Chickpea production

Seed treatment with fungicides

2 g Thiram + 1 g Carbendazim per kg seed

Seed inoculum with *Rhizobium*



Seed inoculum: 70 g of peat inoculum and 300 ml of 10% jaggery solution for 20 kg seed

IMOD

Inclusive Market-Oriented Development

• *Innovate* • *Grow* • *Prosper*

DOs in Chickpea production

Seed rate

Seed size (100-seed weight)

Seed rate

Small (15 – 20 g)

45 – 60 kg/ha

Medium (20 – 30 g)

60 – 90 kg/ha

Large (30 – 40 g)

90 – 120 kg/ha

Extra-large (40 – 50 g)

120 – 150 kg/ha

DOs in Chickpea production

Weed management

Herbicides

Pre-emergence

e.g. Pendimethalin

(1 to 1.5 kg/ha)

Mechanical or Manual



IMOD

Inclusive Market-Oriented Development

• *Innovate* • *Grow* • *Prosper*

DOs in Chickpea production

Irrigation

- One or two need-based irrigation
- Do not give excessive irrigation



A crop showing excessive vegetative growth **IMOD**
Inclusive Market-Oriented Development
• *Innovate* • *Grow* • *Prosper*

DOs in Chickpea production

Post-harvest processing of seed

Drying

Bring moisture level to 12%

Cleaning and grading

Remove inert matter, damaged and undersized seeds

DOs in Chickpea production

Storage

- Store seed in cool and dry place in air tight containers
- Fumigate the container periodically to save seed from bruchids beetle



IMOD

Inclusive Market-Oriented Development

• *Innovate* • *Grow* • *Prosper*

Chickpea (Garbanzos)

An Emerging Crop for the Rainfed and Dryland Areas of the Philippines



Chickpea in the Philippines

- Widely consumed and the demand is met through import.
- Canned chickpeas are imported from the **USA (S&W brand)**, **Italy (Molinera)** and **Malaysia (Kimball brand by Campbell Soup)**.



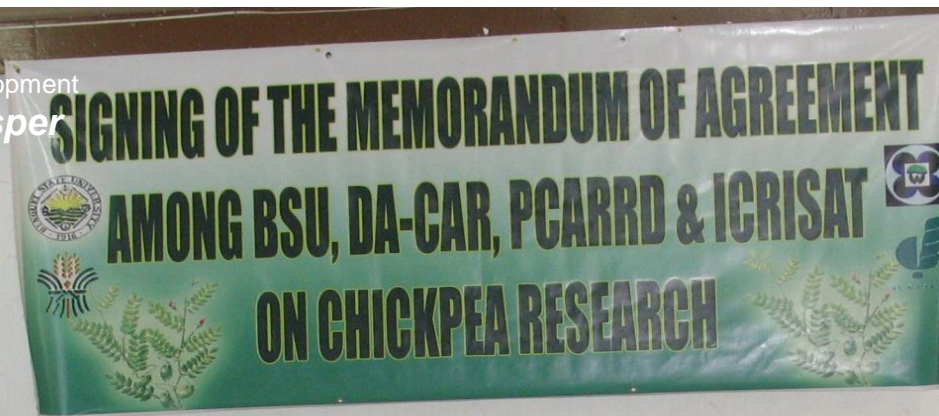
Chickpea in the Philippines

- Annually imports 735 tons of chickpea (valued at \$US 442,000).
- Average wholesale price of chickpea ranges from \$US 0.60-1.20/kg.



Philippine – ICRISAT Collaboration

- Launched in December 11, 2007 by Director General Dr William Dar, re: ‘Introduction and promotion of chickpea in the highlands of the Cordillera Administrative Region (CAR)’
- The research project was jointly supported by ICRISAT, PCARRD, DA with the Benguet State University (BSU) as the implementor.



**SIGNING OF THE MEMORANDUM OF AGREEMENT
AMONG BSU, DA-CAR, PCARRD & ICRISAT
ON CHICKPEA RESEARCH**



Figure 1. MOA signing on December 11, 2007: From left Dr Pedro Jerry Baliang (DA-CAR), Dr Saturnino Ocampo (CHED), Dr William Dar (ICRISAT), Dr Rogelio Colting (BSU), with the presence of Dr William Medrano (CHED). Standing from left Dr Sonwright Maddul (BSU), Dr Fernando Gonzales (BSU), and Dr Myer Mula (DA-CAR).

Turn-over of chickpea seeds



Figure 2. Dr William Dar turned over 190 kgs of chickpea seeds to BSU President Dr Rogelio Colting.

Philippine – ICRISAT Collaboration

Under this project, ICRISAT chickpea cultivars were tested in

7 different studies namely:

- Study 1 Growth and yield as affected by planting distance;
- Study 2 Response of chickpea as affected by different sources of organic fertilizer;
- Study 3 Response of chickpea to different levels of inorganic fertilizer;
- Study 4 Growth and yield of chickpea as affected by weed duration;
- Study 5 Yield response of chickpea as affected by frequency of irrigation;
- Study 6 Postharvest and processing qualities of chickpea harvested at different maturity indices; and
- Study 7 Development of chickpea nutri-food products.

Study 1. Growth and yield as affected by planting distance

- The plant spacing of 30 cm x 10 cm

Highlands: ICCV 93952 (desi) - 2,544 kg/ha and
ICCV 92311 (kabuli) - 2,404 kg/ha,

Lowlands: ICCV 93952 (desi) - 2,407 kg/ha and
ICCV 95332 (kabuli) - 1,913 kg/ha



Desi

size: 16-20 g/100 seeds

Kabuli

size: 34-40 g/100 seeds

Study 2. Response of chickpea as affected by different sources of organic fertilizer

- Sagana 100 (organic fertilizer)

Highlands: ICCV 93952 (desi) - 2,061 kg/ha and
ICCV 92311(kabuli) - 1,871 kg/ha

Lowlands: ICCV 07114 (desi) - 1,268 kg/ha and
ICCV 95332 (kabuli) - 1,203 kg/ha



Desi

Kabuli

size: 16-20 g/100 seeds

size: 34-40 g/100 seeds

Study 3. Response of chickpea to different levels of inorganic fertilizer

- NPK (45-100-45 kg/ha)

Highlands: ICCV 06102 (desi) - 1,739 kg/ha and
ICCV 95334 (kabuli) – 1,166 kg/ha

Lowlands: ICCV 07114 (desi) - 1,410 kg/ha and
ICCV 95332 (kabuli) – 1,136 kg/ha



Desi

size: 16-20 g/100 seeds

Kabuli

size: 34-40 g/100 seeds

Study 4. Growth and yield of chickpea as affected by weed duration

- Weeding from sowing to harvesting

Highlands: ICCV 92311 (kabuli) - 1,809 kg/ha and
ICCV 93952 (desi) - 1,800 kg/ha

Lowlands: ICCV 93952 (desi) - 1,300 kg/ha and
ICCV 92311(kabuli) – 1,034 kg/ha



Desi size: 16-20 g/100 seeds *Kabuli* size: 34-40 g/100 seeds

Study 5. Yield response of chickpea as affected by frequency of irrigation

- Irrigation of every 15 days

Highlands: ICCV 92311 (kabuli) - 2,456 kg/ha and
ICCV 06102 (desi) – 2,017 kg/ha

Lowlands: ICCV 95332 (kabuli) - 1,352 kg/ha and
ICCV 93952 (desi) - 1,328 kg/ha



Desi size: 16-20 g/100 seeds *Kabuli* size: 34-40 g/100 seeds

2007 – 2008 season (Multi-Location Trials)



Bokod, Benguet



La Trinidad, Benguet



Buguias, Benguet



Kapangan, Benguet

2008 – 2009 season: On-station research @ BSU



Study 6 Postharvest and processing qualities of chickpea harvested at different maturity indices

2009 – 2010 season



- a. Sensory evaluation of cooked dal as affected by maturity indices.
- b. Sensory evaluation of cooked whole grain as affected by maturity indices.
- Study 7 Development of chickpea nutri-food products.

2009-2010 Season: Capacity Building



'Chickpea Production Technology Training' on February 24-26, 2010 at BSU, La Trinidad, Benguet.



Dr Gaur conducts hands-on training



Field visit by ICRISAT scientist on on-station research

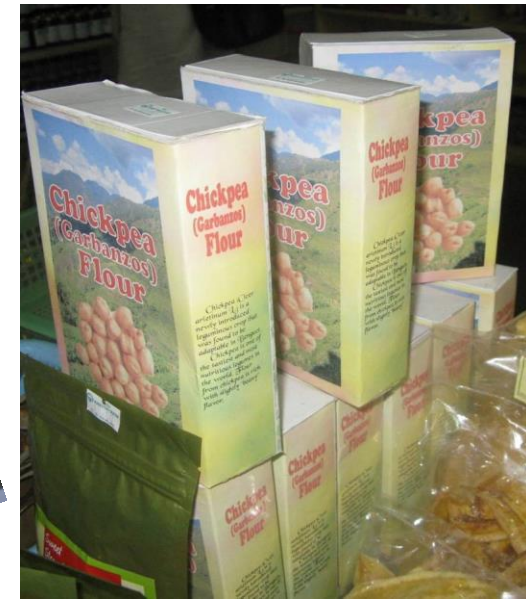
2009 – 2010 Season: On-Farm Research



Field visit of on-farm trials at Itogon and Tublay, Benguet



2011 Season - Development of by-products



The Way Forward

- **Government support on R4D** to seed growers and institutions with the provision of postharvest facilities and equipment.
- **Government support through public-private partnership** to enhance seed production and by-product development of chickpea as the impetus to **sustain domestic demand and to export market.**
- **Feeding programs for school children and women** (especially the mothers) in malnourished stricken provinces of the Philippines to be instituted by the Department of Social Welfare and Development (DSWD) in collaboration with the Department of Education (DepEd) and the Department of Agriculture (DA) that will help in the promotion of nutritional value of chickpea.
- **Human resource strengthening through trainings and field demonstrations** with emphasis on cultural management, by-product development and marketing.
- **Feasible in the Rice-Fallow cropping system**
- **Seed Delivery Systems**



Publications

- Gonzales FR, Bawang FG, Gonzales IC, Gaur P and Mula MG. 2010. Germplasm Collection, Characterization and Evaluation of Chickpea (*Cicer arietinum*) Varieties Under Highland and Lowland Conditions of Benguet. Journal for International Society for Southeast Asian Agricultural Sciences (ISSAAS) 16(1):123-161
- MG Mula, FR Gonzales, RP Mula, PM Gaur, IC Gonzales, WD Dar, JE Eusebio, SSL Ilao. 2011. Chickpea: An Emerging Crop for the Rainfed and Dryland Areas of the Philippines ICRISAT, Patancheru 502 324, AP., India. Information Bulletin 88.
- FR Gonzales, MG Mula, RP Mula, PM Gaur and A Rathore. 2011. Growth and yield response of chickpea (*Cicer arietinum* L.) to frequency of irrigation under Philippine condition. Green Farming 2(3):253-256.
- FR Gonzales, MG Mula, RP Mula, PM Gaur and A Rathore. 2011. Response of Chickpea (*Cicer arietinum* L.) to Different Sources of Organic Fertilizers under Philippine Condition. Green Farming (accepted)

What ICRISAT Can Offer

- New Genetic Materials including heat tolerant lines
- Technical Support
- New Technologies
- Season-long Training
- Monitoring

THANK YOU

DEVELOPMENT OF
PACKAGE OF TECHNOLOGY
ON CHICKPEA (*Cicer arietinum*)
IN CAR

GROWTH AND YIELD OF
CHICKPEA (*Cicer arietinum*) VARIETIES
AS AFFECTED BY PLANTING
DISTANCE UNDER FERTILE
BENGUET CONDITION
FUNDING AGENCY: SUTOM-1
ICRISAT
DATE PLANTED: NOV 2-3, 2014