Chickpea Production in India

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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 share (%): 80%
- World’s production (%): 65%
- Indian production (million t)

Production (million t):
- 1961-63: 80%
- 1964-66: 65%
- 1970-72: 80%
- 1976-76: 65%
- 1979-81: 80%
- 1982-84: 65%
- 1985-87: 80%
- 1991-93: 65%
- 1994-96: 80%
- 1997-99: 65%
- 2000-02: 80%
- 2003-05: 65%
- 2006-07: 80%

Share (%):
- 1961-63: 80%
- 1964-66: 65%
- 1970-72: 80%
- 1976-76: 65%
- 1979-81: 80%
- 1982-84: 65%
- 1985-87: 80%
- 1991-93: 65%
- 1994-96: 80%
- 1997-99: 65%
- 2000-02: 80%
- 2003-05: 65%
- 2006-07: 80%
Indian pulse production: Share of different pulses

- Chickpea: 46%
- Pigeonpea: 16%
- Urdbean: 10%
- Mungbean: 8%
- Lentil: 6%
- Pea: 4%
- Others: 10%

IMOD
Inclusive Market-Oriented Development
• Innovate • Grow • Prosper
Trends in area, production and yield of chickpea in India

Area (m ha)/Production (m t)
Yield (kg/ha)

Share of different states in Indian chickpea production

- MP: 38%
- AP: 10%
- Rajasthan: 14%
- Maharashtra: 15%
- UP: 8%
- Chhattisgarh: 3%
- Karnataka: 5%
- Gujarat: 3%
- Haryana: 1%
- Others: 3%

Inclusive Market-Oriented Development

- Innovate
- Grow
- Prosper
Shift in chickpea area from Northern and Northeastern India to Central and Southern India

- **Northern and Northeastern States**
  - 1965-66 to 1969-70: 4.2 m ha
  - 1970-71 to 1974-75: 2.2 m ha
  - 1975-76 to 1984-85: 0.9 m ha

- **Central and Southern States**
  - 1965-66 to 2006-07: 5.0 m ha
India imports chickpea
## Cultivars preferred by farmers in India

### Desi type

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Year of release</th>
<th>Days to maturity</th>
<th>100-seed weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICCC 37</td>
<td>1989</td>
<td>90-95</td>
<td>20-22</td>
</tr>
<tr>
<td>JG 11</td>
<td>1999</td>
<td>90-100</td>
<td>20-22</td>
</tr>
<tr>
<td>JG 130</td>
<td>2000</td>
<td>100-110</td>
<td>25-27</td>
</tr>
<tr>
<td>JAKI 9218</td>
<td>2006</td>
<td>95-105</td>
<td>22-25</td>
</tr>
</tbody>
</table>
### Cultivars preferred by farmers in India

#### Kabuli type

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Year of release</th>
<th>Days to maturity</th>
<th>100-seed weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICCV 2</td>
<td>1989</td>
<td>85-90</td>
<td>24-26</td>
</tr>
<tr>
<td>KAK 2</td>
<td>1999</td>
<td>90-100</td>
<td>34-38</td>
</tr>
<tr>
<td>JGK 1</td>
<td>2002</td>
<td>95-105</td>
<td>32-34</td>
</tr>
<tr>
<td>Vihar</td>
<td>2002</td>
<td>100-110</td>
<td>32-34</td>
</tr>
<tr>
<td>LBeG 7</td>
<td>2006</td>
<td>95-105</td>
<td>32-34</td>
</tr>
</tbody>
</table>
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**

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>kg per ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen</td>
<td>20</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>40</td>
</tr>
</tbody>
</table>

*If deficient*

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>kg per ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potash</td>
<td>20</td>
</tr>
<tr>
<td>Sulphur</td>
<td>20</td>
</tr>
<tr>
<td>Zinc</td>
<td>5</td>
</tr>
<tr>
<td>Boron</td>
<td>2</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>1</td>
</tr>
</tbody>
</table>
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
## DOs in Chickpea production

### Seed rate

<table>
<thead>
<tr>
<th>Seed size (100-seed weight)</th>
<th>Seed rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small (15 – 20 g)</td>
<td>45 – 60 kg/ha</td>
</tr>
<tr>
<td>Medium (20 – 30 g)</td>
<td>60 – 90 kg/ha</td>
</tr>
<tr>
<td>Large (30 – 40 g)</td>
<td>90 – 120 kg/ha</td>
</tr>
<tr>
<td>Extra-large (40 – 50 g)</td>
<td>120 – 150 kg/ha</td>
</tr>
</tbody>
</table>
DOs in Chickpea production

Weed management

Herbicides

Pre-emergence

e.g. Pendimethalin

(1 to 1.5 kg/ha)

Mechanical or Manual

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
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
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.
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
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
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
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
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
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

- Sensory evaluation of cooked dal as affected by maturity indices.
- Sensory evaluation of cooked whole grain as affected by maturity indices.

- Study 7 Development of chickpea nutri-food products.

IMOD
Inclusive Market-Oriented Development

Innovate • Grow • Prosper
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


What ICRISAT Can Offer

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