General Information

Andhra Pradesh (AP)
Rainfall-AP (5-year average): 908 mm annually
Rainfall-Kurnool (avg. 2008-09 to 2012-13): 668 mm
Total cultivated land (India) 15.78 million acres
Total GCA (Andhra Pradesh): 14.51 million hectares
Total chickpea cultivation (India): The area under chickpea has increased from 6.45 million ha in 1992-93 to 8.52 million ha in 2012-13.
Chickpea cultivation (area) The area under chickpea in Andhra Pradesh has increased from 60,000 ha in 1992-93 to 680,745 ha in 2012-13.
In Kurnool: 0.21 million hectares
In Prakasam: 0.11 million hectares
% Earnings from agriculture 60% of population engaged in agriculture and related activities

Myanmar
Rainfall: In the delta region about 2,500 mm of rain per year (Yangon 2,700 mm), while the average annual rainfall in the dry zone in the center of Myanmar is less of 1,000 mm (840 mm Mandalay).
Total cultivation (area): 1,109,840 km² approx. (2007)
• Total chickpea cultivation in Myanmar is mainly in the central dry zone of the country, on an estimated area of 200,000 hectares.
• The major agricultural product is rice, which covers about 60% of the country’s total cultivated land area.
• Agriculture in Myanmar is the main industry in the country, accounting for 60% of the GDP and employing about 65 percent of the labor force


275,068 km²
AP (Area) 2011

8,45,80,777
AP (Population) 2011

$1.842 trillion
India (GDP-2012)

754,409 cr
AP (GDP, 2012-13)

61,120,000
Myanmar (estimated population, 2012)

$51.92 billion
Myanmar (GDP-2011)
Fifteen years ago, chickpea was a subsistence crop in the state of Andhra Pradesh in India and in Myanmar. The chickpea area was comparatively small (133,000 ha in Andhra Pradesh and 141,000 in Myanmar) and the average yields were low (714 kg/ha in Andhra Pradesh and 663 kg/ha in Myanmar). Farmers were growing old varieties and landraces, which had low productivity and were susceptible to the devastating fusarium wilt disease. Because of low yield levels, farmers were reluctant to invest in improvements by providing inputs to the crop that could ensure optimum crop growth and management of insect-pests.
The Solution

ICRISAT, in partnership with the research institutes in India and Myanmar, developed early maturing chickpea varieties, which were well adapted to the short-season environments of Andhra Pradesh and Myanmar. These varieties had high yield potential, high resistance to fusarium wilt and seed quality preferred by markets. Because of their early maturing characteristic, these varieties could escape end-of-season (terminal) drought and heat stresses. Concerted efforts were made by ICRISAT and partners to enhance adoption of these cultivars by enhancing awareness of farmers and availability of seed.

The Success

Andhra Pradesh: A desi chickpea cultivar, Annigeri-1, developed in 1940 (officially notified in 1978) has been the ruling chickpea variety in Andhra Pradesh for over six decades. It is estimated that Annigeri-1 covered over 90% of the chickpea area in Andhra Pradesh up to 2001. Though short duration chickpea cultivars ICCC 37 and ICCV 2 were released in 1989, these varieties could not replace Annigeri-1. Later, two short-duration, high yielding varieties were released, JG 11 (a desi variety) in 1999, and KAK 2 (a kabuli variety) in 2000. ICRISAT and ANGRAU started promoting the new chickpea cultivars JG 11 and KAK 2 from the 2002-03 crop season. As a result, the area grown to Annigeri-1 reduced to 45% in Kurnool district and 24% in Prakasam district by 2007. The Tropical Legumes II (TL II) project, which started during the 2007-08 crop season, boosted promotion of improved chickpea cultivars in Andhra Pradesh. Large numbers of farmer-participatory varietal selection (FPVS) trials were conducted and JG 11, KAK 2, JAKI 9218 and Vihar were identified as farmer-preferred cultivars. Concerted efforts made under the TL II project on knowledge empowerment of farmers on improved cultivars, production technologies and enhancing seed availability accelerated adoption of improved cultivars by farmers. An early adoption survey was conducted in 2009-10, which indicated that the area under improved cultivars (JG 11,
KAK 2, JAKI 9218) had increased from 55 to 90% in Kurnool and 67 to 97% in Prakasam district during 2007-08 to 2009-10.

During the past 15 years (from triennium 1996/97-1998/99 to 2010/11-2012/13), chickpea recorded an increase of 7.2-fold (93,000 to 667,000 tons) in production, because of a 4.6-fold increase in area (133,000 to 615,000 ha), and a 1.5-fold increase in yield (714 to 1091 kg/ha).

**Myanmar:** Four varieties, Yezin 3 (ICCV 2), Yezin 4 (ICCV 88202), Yezin 6 (ICCV 92944) and Yezin 8 (ICCV 97314) released in the period 2000 to 2009 were preferred and adopted rapidly by farmers. These varieties have early (Yezin 4, Yezin 6 and Yezin 8) to extra-early (Yezin 2) maturity, fusarium wilt resistance and high yield potential. Yezin 6 is a heat tolerant cultivar released as JG 14 in India. Yezin 8 is a large-seeded kabuli chickpea variety that receives premium prices in the international market. During the 2011-12 crop season, these varieties covered 87% of the area in Myanmar. The adoption of these varieties along with improved crop production practices led to a 2.4-fold increase in area (141,000 ha to 332,000 ha), doubling of the productivity (663 to 1419 kg/ha) and a 5.3-fold increase (90,000 to 472,000 tons) in production of chickpea in Myanmar during the past 15 years (from triennium 1996/97-1998/99 to 2010/11-2012/13). Myanmar restarted export of chickpea in 2001 after almost no export for over two decades. Chickpea exports were on an average 50,000 tons (valued at US$ 24.0 million) per year from 2001 to 2011. Chickpea is currently a commercial crop in Myanmar and has helped smallholder farmers in linking to markets and enhancing incomes.

**Market Driven**

The farmers in Andhra Pradesh and Myanmar found chickpea to be a very remunerative crop because of good market prices and reduced labor requirements.
due to increased mechanization. Grain storage facilities are available to farmers in Andhra Pradesh at the local level and at an affordable tariff, which helps the farmers avoid distress selling at harvest and thus getting a better price for their produce. Kabuli chickpea varieties promoted in Andhra Pradesh fetch premium prices in both, the domestic and international markets. Indian export of chickpea enhanced substantially in recent years and the kabuli chickpea grown in Andhra Pradesh has significantly contributed to this. The increased chickpea production in Myanmar helped the country in restarting export of chickpea in 2001 after almost no export for over two decades.

Incorporating Inclusiveness
The chickpea farmers in Andhra Pradesh and Myanmar are smallholders. Inclusion of all sectors of farmers and women farmers was ensured in FPVS trials. In addition, selection of farmers in seed production and participation in training programs, field days, farmers’ fairs and other activities ensured inclusiveness.

Lessons Learned
There were several lessons learned from the IMOD-led chickpea success stories of Andhra Pradesh and Myanmar. It was evident that the farmers’ awareness of the improved varieties and availability of the seed of improved varieties are the key factors in the spread of improved chickpea cultivars. FPVS trials and distribution of seed samples are very effective in enhancing awareness of farmers to improved varieties and rapidly spreading demand for the new varieties. The seed traits preferred by the market, price in the domestic and international market, and linkages of farmers with the market influence the adoption of improved cultivars by farmers.

The Way Forward
The farmers in Andhra Pradesh are now demanding varieties that can be harvested by combine harvesters and in which weeds can be controlled by application of post-emergence herbicides. This is because of the increasing cost and decreasing availability of labor. Thus, ICRISAT and partners are now working on development of chickpea cultivars suitable for mechanical harvesting and tolerant to herbicides. Similarly, new heat tolerant varieties are being developed for Myanmar. The efforts on adoption of improved cultivars are being made through Tropical Legumes II and the OCPF project in Andhra Pradesh and an ACIAR project in Myanmar.

Linked Projects
Most of the earlier efforts in Andhra Pradesh and Myanmar were without any externally funded project. The efforts in Andhra Pradesh were enhanced in 2007 by the Tropical Legumes II project funded by Bill & Melinda Gates Foundation. Later, further support was received from the EU-IFAD and OCPF projects. Similarly, in Myanmar, the efforts were strengthened by an ACIAR project in recent years.

Key Information
Name of project: 1) Tropical Legumes II
Key scientists: PM Gaur, CLL Gowda
Project duration: Ongoing since 2007
Key partners: (1) Acharya NG Ranga Agricultural University (ANGRAU), Hyderabad, (2) Andhra Pradesh State Seed Development Corporation (APSSDC), Hyderabad, (3) State Farms Corporation of India Limited (SFCI), Regional Office, Hyderabad 500 029, India; (4) National Seed Corporation (NSC), Regional Office, Secunderabad

2) IFAD-European Commission Project “Improving farmers livelihoods and food security through enhanced legume productivity in India and Myanmar”

Key scientists: GV Ranga Rao, PM Gaur, CLL Gowda

Project duration: January 2011 to December 2012

Key partners (Andhra Pradesh): Acharya NG Ranga Agricultural University, (ANGRAU), Hyderabad

Key partners (Myanmar): (1) Department of Agricultural Research (DAR) , Yezin, Nay Pyi Taw; (2) Myanmar Agriculture Service (MAS)

3) OCPF project “Morocco-India Food Legumes Initiative (MIFLI)”

Key scientists: Ch Ravinder Reddy, PM Gaur, GV Ranga Rao, CLL Gowda

Project duration: Ongoing since April 2013

Key partners: Acharya NG Ranga Agricultural University, (ANGRAU), Hyderabad

4) In Myanmar, ACIAR Project “Multidisciplinary legume based farming systems in the central dry zone of Myanmar to improve food security and farmer livelihoods”

Project duration: Ongoing since July 2013

Key scientists: GV Ranga Rao, PM Gaur, CLL Gowda

Key partners: (1) Department of Agricultural Research (DAR); (2) Myanmar Agricultural Services (MAS); (3) Yezin Agricultural University (YAU).

This work was undertaken as part of the

A farmer transporting chickpea harvest in Myanmar.