

## Development and adoption of improved chickpea varieties in Myanmar

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Citation : Than AM, Maw JB, Aung T, Gaur PM and Gowda CLL, (2007) Development and adoption of improved chickpea varieties in Myanmar. Journal of SAT Agricultural Research 5(1).

Chickpea (*Cicer arietinum*) is an important food legume in Myanmar. It is mainly grown in central dry zone of the country, mainly in Sagaing (54%), Magway (26%) and Mandalay (16%) divisions (Table 1). During 2004–05, the chickpea area in Myanmar was about 205,000 ha, with a production of 239,000 t, and average yield was 1,171 kg ha<sup>-1</sup>. Chickpea is grown under residual soil moisture in both lowland and upland conditions. In lowland areas, it is grown as a relay or sequential crop after rice (*Oryza sativa*), while in upland areas it is grown mostly on black soils (Vertisols) with a good water holding capacity after an early short-duration crop of sesame (*Sesamum indicum*), maize (*Zea mays*) or pulses or after fallow. Chickpea is also sown along the banks of Ayeyarwaddy River after the flood water recedes.

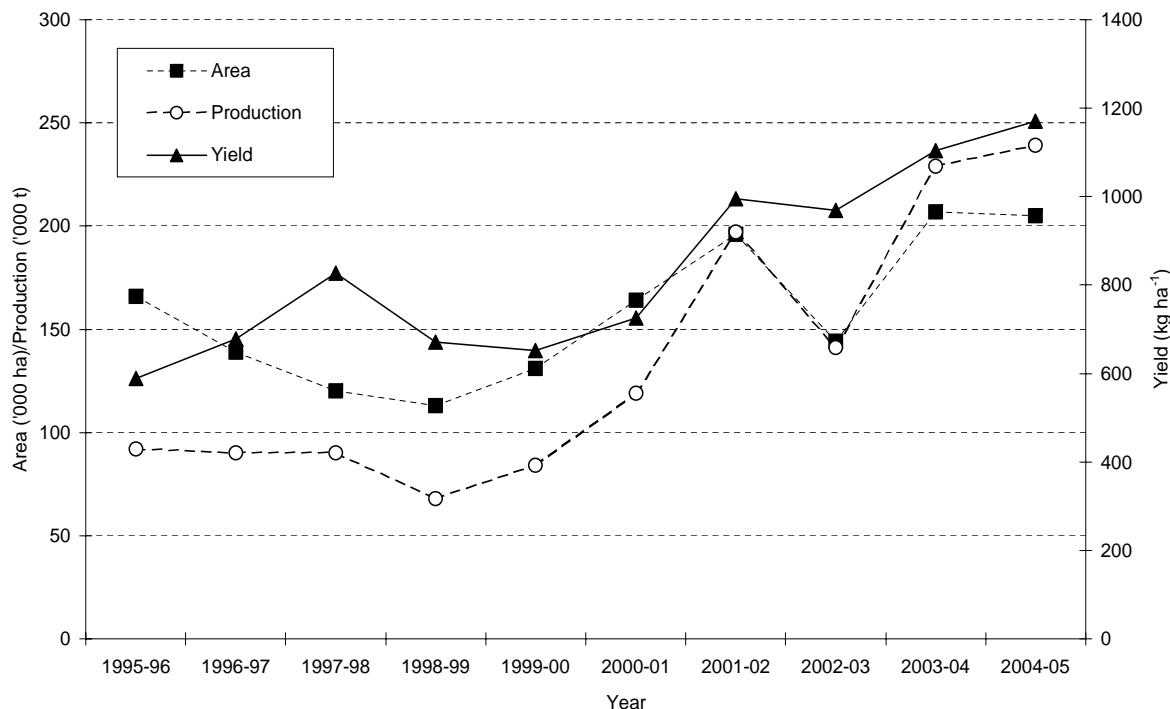
The Department of Agricultural Research (DAR), assisted by the Regional Research Farms and Extension Division of Myanma Agriculture Service conducts chickpea research and development (R&D) in Myanmar. The major objectives in chickpea breeding include improvement in yield potential, resistance to root diseases (mainly Fusarium wilt, collar rot and dry root rot) and pod borer; tolerance to terminal drought and heat stresses; and market-preferred seed traits. Development of early maturing varieties is important as chickpea is grown in post-rainy season on residual soil moisture without irrigation, and hence terminal drought and heat stresses are the major constraints to chickpea production. Introduction and pure line selection were initially used by DAR for varietal development. Hybridization program in chickpea started in 1991 and is presently being carried out at Zaloke Research Farm of DAR. Preliminary yield trials on selected breeding lines are conducted at Zaloke, Pankone and Tatkone Research Farms, while advanced yield trials are conducted at Myingyan and Kyaukse Research Farms. Selected pre-release varieties are further evaluated in farmers' fields jointly by farmers, researchers and extension workers.

DAR has strong collaboration with the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru, India in chickpea R&D. ICRISAT

**Table 1. Distribution of chickpea area in different divisions of central Myanmar during 2005–06.**

Division/ District	Area (ha)	Yield (kg ha <sup>-1</sup> )	Production (t)
<b>Sagaing</b>			
Sagaing	12,610	1,256	15,840
Monywa	71,930	1,318	94,820
Shwebo	30,860	1,530	47,230
Kathar	50	1,368	60
Kalay	680	1,256	850
Maulike	90	1,251	120
Total	116,230	1,367	158,930
<b>Magway</b>			
Gantgaw	1,200	850	1,020
Pakkoku	12,240	1,099	13,460
Magway	6,570	1,234	8,100
Minbu	29,450	1,113	32,780
Thayet	8,060	1,062	8,560
Total	57,520	1,112	63,910
<b>Mandalay</b>			
Mandalay	2,770	961	2,660
Pyin Oo Lwin	1,460	849	1,240
Kyaukse	10,010	887	8,880
Meikhtila	8,820	815	7,180
Myingyan	9,330	732	6,830
Nyaungoo	30	446	20
Yamaethin	6,130	606	3,720
Pyinmana	1,180	1,083	1,270
Total	39,750	797	31,820

Source: Myanma Agriculture Service.



**Figure 1.** Trends in area, production and yield of chickpea in Myanmar during the past decade (1995–96 to 2004–05).

provided over 4,400 chickpea germplasm and breeding lines to Myanmar during 1975 to 2006. Six chickpea varieties have so far been released in Myanmar from the germplasm/breeding lines supplied by ICRISAT. These are Yezin 1 (P 436), Yezin 2 (JG 62), Yezin 3 (ICCV 2), Yezin 4 (ICCV 88202), Yezin 5 (ICCV 3) and Yezin 6 (ICCV 92944). Yezin 1, Yezin 2, Yezin 4 and Yezin 6 are desi type, while Yezin 3 and Yezin 5 are kabuli type. Yezin 1 and Yezin 2, released before 1990, are now no more under cultivation due to their susceptibility to Fusarium wilt. Yezin 3 and Yezin 4 were released in 2000 and Yezin 5 and Yezin 6 in 2004. These varieties have wide adaptation as evidenced from their release in two or more countries. ICCV 2 (Yezin 3) has also been released in India (as Swetha) and Sudan (as Wad Hamid). Similarly, ICCV 88202 (Yezin 4) has been released in Australia (as Sona) and India (as Pratap Chana 1).

The adoption of new improved chickpea varieties (Yezin 3 to Yezin 6) has been very rapid. During 2004–05, these varieties covered about 82% of total chickpea

area in Myanmar. The adoption of improved varieties was 91% in Sagaing Division, 71% in Mandalay and 72% in Magway Division (Table 2). Yezin 3 (ICCV 2) was the most popular variety grown in about 55% of area followed by Yezin 4 (ICCV 88202) with 22% coverage of area. Yezin 5 (ICCV 3) and Yezin 6 (ICCV 92944) covered 4% and 1% area, respectively.

The adoption of improved varieties and improved crop production practices has led to remarkable increase in chickpea yields and production in Myanmar. During the past decade (1995–96 to 2004–05), the chickpea area in Myanmar has increased by 23.5% (from 166,000 to 205,000 ha), production has increased 2.6 times (from 92,000 t to 239,000 t) and yields have almost doubled (from 588 to 1171 kg ha<sup>-1</sup>) (Fig. 1). During 2005, Myanmar was the fifth largest chickpea producing country after India, Pakistan, Turkey and Iran (FAOSTAT 2007). Myanmar is emerging as an important chickpea exporting country. After meeting the domestic demand, Myanmar is exporting surplus chickpea produce to neighboring countries.

The annual export of chickpea by Myanmar has ranged between 29,577 and 73,551 t during the past five years (2001 to 2005) (FAOSTAT 2007). There is high demand for chickpea in India, Bangladesh and Pakistan as chickpea production in these countries has not been able to cope up with the growing domestic demands. Myanmar

**Table 2. Area, production and yield of chickpea varieties in central Myanmar during 2005–06.**

Division/ Variety	Area (ha)	Yield (kg ha <sup>-1</sup> )	Production (t)
<b>Sagaing</b>			
Yezin 3 (ICCV 2)	103,126	1,364	140,492
Yezin 4 (ICCV 88202)	911	1,478	1,344
Yezin 5 (ICCV 3)	161	1,421	228
Yezin 6 (ICCV 92944)	1,525	1,479	2,250
ICCV 95311	502	1,721	862
Local	10,003	1,367	13,653
<b>Magway</b>			
Yezin 3 (ICCV 2)	3,264	1,192	3,885
Yezin 4 (ICCV 88202)	36,355	1,124	40,777
Yezin 5 (ICCV 3)	648	1,052	680
Yezin 6 (ICCV 92944)	56	1,357	76
ICCV 37	233	976	227
Local	16,366	1,079	17,632
<b>Mandalay</b>			
Yezin 3 (ICCV 2)	10,602	915	9,683
Yezin 4 (ICCV 88202)	9,315	843	7,838
Yezin 6 (ICCV 92944)	104	1,064	110
Local	19,726	719	14,165

Source: Myanma Agriculture Service.

can play an important role in meeting the demand and stabilizing the prices of chickpea in South Asia.

The chickpea breeding program of DAR is now emphasizing development of varieties with seed traits preferred in international market. In kabuli type, the large-seeded varieties fetch higher price compared to small- or medium-seeded varieties. Yezin 3 (that covers over half of the chickpea area in Myanmar) has medium seed size (100-seed weight 24–25 g). Thus, efforts are being made to develop varieties that have large seed (100-seed weight >30 g). Two large-seeded (100-seed weight 30 to 34 g) kabuli breeding lines supplied by ICRISAT (ICCV 95311 and ICCV 97314) are presently being evaluated in on-farm trials for potential release. ICCV 95311 is becoming popular in upland areas of Sagaing Division, where it was grown in about 500 ha during 2004–05. ICCV 97314 is an extra-early line maturing in about 85 days, similar to Yezin 3 (ICCV 2), and has improved resistance to root diseases. A desi type breeding line (Shwenilonegyi) developed at DAR from Yezin 4 × ICC 16145 is also at pre-release stage of evaluation. It has attractive grains with high recovery of dhal. It is becoming popular in Sagaing and Mandalay Divisions.

The recent progress in development and adoption of improved chickpea varieties in Myanmar has been very encouraging. This is important not only for Myanmar but also for neighboring South Asian countries for bridging the gaps between production and demand of chickpea in the region.

## Reference

**FAOSTAT.** 2007. <http://faostat.fao.org/site/567/default.aspx>; last accessed 7 June 2007.