Pitic 93

This cultivar was obtained through hybridization and selection. Crosses were made in the following sequence: the line L 1974 was crossed with Macarena. The pedigree method of selection was performed from F_2 to F_4 for fusarium wilt resistance and high yield. L 1855 was also crossed with Surutato 77, the pedigree method of selection was used from F_2 to F_4 for erect plant growth habit and high yield. Both F_4 uniform lines were then crossed and the pedigree method of selection was used from F_2 to F_4 to obtain an erect, fusarium wilt resistant, high-yielding line. Mass selection was used from F_5 to F_8 to reach uniformity of the line.

Plant and seed characteristics. Early December sowings flower from 66 to 136 DAS and the crop reaches physiological maturity at 156 DAS. The first pods are present at 80 DAS. The plants have compound, light-green leaves with 11 to 13 leaflets, and have an upright growth habit. The flowers are white. Each pod contains 1 to 3 seeds. The seeds are ramhead-shaped, creamy, with a 100-seed mass between 43 and 47 g.

Yield trials and disease resistance. During experimental trials over 4 years at several locations in the Hermosillo coastal area, Pitic 93 outyielded Mocorito 88 by 19%, Surutato 77 by 34%, and Tubutama 88 by 55%, (Table 1). In on-farm research over 3 years Pitic 93 outyielded Mocorito 88 by 27%, Surutato 77 by 22%, and Tubutama 88 by 17%. Greenhouse studies were carried out to determine this cultivars' reaction to *Fusarium oxysporum* f.sp *ciceri* in four infested soils. Results indicate that Pitic 93 was resistant, with only 2% infected plants, while the susceptible local control Dorado 88 had 58% infected plants.

References

Haware, M.P., Jiménez Déaz, R.M., Amin, K.S., Phillips, J.C., and **Halita, H.** 1990. Integrated management of wilt and root rots of chickpea. Pages 129–137 *in* Chickpea in the nineties: proceedings of the Second International Workshop on Chickpea Improvement 4–8 Dec 1989, ICRISAT Center, India. Patancheru, A.P. 502 324, India: International Crops Research Institute for the Semi-Arid Tropics.

Nene, Y.L., Reddy, M.V., Haware, M.P., Ghanekar, A.M., and **Amin, K.S.** 1991. Field diagnosis of chickpea diseases and their control. Information Bulletin no. 28. Patancheru, Andhra Pradesh 502 324, India: International Crops Research Institute for the Semi-Arid Tropics.

Nene, Y.L., and **Reddy, M.V.** 1987. Chickpea diseases and their control. Pages 233–270 *in* The chickpea (Saxena, M.C., and Singh, K.B., eds.). Wallingford, Oxfordshire, UK: CAB International.

New Chickpea Varieties for Myanmar

Onkar Singh[1], **Thein Han**[2], **Kyaw Moe**[3], **Kyin Sein**[3], **Aung Shwe**[3], **Aung May Than**[3], and **Cho Win Hlaing**[3] (1. Genetic Enhancement Division, ICRISAT Asia Center, Patancheru 324 502, Andhra Pradesh, India; 2) Myanma Agriculture Service, 3. Central Agricultural Research Institute, Myanmar)

Chickpea is the most important legume crop in Myanmar in terms of domestic consumption. Every year mainly desi chickpea is grown on more than 0.2 million ha in various cropping systems in both northern and southern Myanmar. It is generally grown as a rainfed crop after sesame, rice, maize, sorghum, or summer fallow in Bago, Sagaing, Mandalay, Magwe, and Ayeyarwady Divisions. It is a recent introduction in Shan, Kayah, and Kachin states.

The average chickpea yield in Myanmar varies between 0.5 and 0.9 t ha^{-1}. The major biotic constraints to production are pod borer (*Helicoverpa armigera*), root rots (*Sclerotium rolfsii* and *Rhizoctonia bataticola*), wilt (*Fusarium oxysporum* f.sp. *ciceri*), and chickpea stunt disease. Drought, heat, soil acidity, and soil salinity are the major abiotic constraints. Karachi, a variety introduced from India is widely grown. Chickpea improvement activities were initiated by the Central Agriculture Research Institute (CARI), Yezin early in 1980. The local landrace variants of variety Karachi were collected and evaluated. Germplasm and breeding lines were introduced from ICRISAT Asia Center, India. The multilocational evaluation of these newly introduced lines resulted into the identification and release for cultivation by farmers of varieties Yezin 1 and Schwe Kyehmon in 1986. These varieties, although superior to Karachi in yield potential, were subsequently found to be susceptible to wilt and root rot diseases and consequently have not been adopted by farmers.

Table 1. Performance of promising chickpea varieties at various research stations in Myanmar, 1986–93.

	Yield (t ha^{-1})						
Variety	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93
ICCV 2	2.77(1)[1]	-	1.29(3)	1.26(1)	1.42(2)	2.00(3)	2.20(4)
ICCV 5	2.15(1)	-	1.17(4)	-	0.81(1)	1.41(4)	2.51(3)
Local (desi)	1.98(2)	-	1.59(2)	-	-	1.70(2)	1.92(3)
Local (kabuli)	-	-	1.00(3)	0.96(1)	0.96(1)	0.64(1)	1.47(4)
ICCV 42	3.46(1)	-	1.75(2)	1.28(1)	1.78(2)	2.30(4)	1.84(7)
Local (desi)	2.30(1)	-	1.26(2)	1.55(1)	0.98(2)	1.18(4)	1.28(7)
ICCC 37	-	1.26(1)	2.31(2)	2.03(2)	0.81(1)	1.88(3)	1.80(5)
Local (desi)	-	1.61(1)	2.19(2)	1.88(2)	0.68(1)	1.46(2)	1.19(5)
ICCV 88201	-	-	-	-	-	2.46(2)	1.62(5)
ICCV 88202	-	-	-	-	-	2.01(2)	1.52(5)
ICCV 10	-	-	-	-	-	3.56(1)	1.74(3)
Local (desi)	-	-	-	-	-	2.08(2)	1.36(8)

1. Figures in parentheses indicate the number of test locations.

Table 2. Performance of promising chickpea varieties in farmers' fields in Myanmar, 1987–93.

	Yield (t ha^{-1})					
Variety	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93
ICCV 2	-	1.69(6)	1.55(2)	1.46(1)	1.53(8)	-
ICCV 5	-	1.64(6)	1.68(2)	1.29(1)	-	0.84(11)
ICCC 42	1.77(2)[1]	1.70(6)	2.02(2)	-	1.72(7)	1.00(10)
ICCV 10	-	-	-	-	-	0.89(14)
Local (desi)	1.44(2)	1.49(6)	1.59(2)	1.45(1)	1.71(7)	0.69(14)

1. Figures in parentheses indicate the number of test locations.

As the collaboration between CARI and ICRISAT on chickpea improvement grew, new and more promising chickpea lines were introduced into Myanmar though the more than 50 sets of international nurseries/trials from ICRISAT received in Myanmar since 1985. These trials have been evaluated at a number of locations in each year, and genotypes found superior to the local cultivars in yield and resistance to diseases and pests selected. The selected lines have been further evaluated in preliminary and advanced multilocational station trials and farmers' field tests. Among these, ICCV 2, ICCV 5, ICCC 42, and ICCV 88202 have performed better than the local cultivars (Tables 1 and 2). ICCV 2 (kabuli) and ICCV 88202 (desi) are extra-short-duration cultivars that mature within 100 days. They fit well into various cropping systems and provide the farmer with flexible sowing dates. These two varieties make efficient use of the limited soil moisture in a shortest possible time and can also escape terminal drought and pod borer damage. ICCC 42 (desi) and ICCV 5 (kabuli) are of short to medium-duration and efficiently use nutrients and soil moisture under irrigation. All the new cultivars are resistant to wilt. ICCC 42 is a large-seeded and drought-tolerant variety.

These four varieties are already in on-farm trials in various chickpea-growing areas of Myanmar, where farmers seem to be very enthusiastic about them. ICCV 2 has spread over about 500 ha in Sagaing Division alone during 1993/94. Farmers who grow ICCV 2 reap the benefits of early harvest, high yields, and a good market price. The new varieties are being considered by the National Seed Committee for release. Their release will enable farmers to choose appropriate varieties for their specific needs, e.g., desi or kabuli, short- or medium-duration, for rainfed or irrigated environments.

As collaboration between Myanmar and ICRISAT is strengthened, the evaluation of new promising breeding lines will be intensified on both research stations and farmers' fields. In a significant development, CARI has initiated a chickpea breeding program that involves crossing and screening of segregating populations in wilt and root rot nurseries.

Potential for Expansion of Chickpea in the Barind Region of Bangladesh

Jagdish Kumar[1], **Matiur Rahman**[2], **MA Musa**[3], and **Sirajul Islam**[3]
[1. Crop Diversification Programme (CDP), Khamarbari, Dhaka 1215, Bangladesh, Present address: ICRISAT Asia Center (Corresponding author), 2. Pulses Research Centre (PRC), Regional Agricultural Research Station, Ishurdi, Pabna, Bangladesh, 3. On-farm Research Division (OFRD), BARI, Kazihata, Rajshahi, Bangladesh]

Pulses are important both as components of human diet and as part of the rainfed agriculture cropping system of Bangladesh. The present diet availability of only 12 g per capita per day is rather low. The area under pulses is declining with the expansion of irrigated facilities that encourage the cultivation of such crops as rice and wheat. Chickpea is presently the third most important pulse crop in Bangladesh. Currently most of the chickpea areas are confined to five districts; Faridpur, Jessore, Kustia, Pabna, and Rajshahi (Khaleque et al. 1991). The crop is usually cultivated on the clay-loam or clay soils of the Gangetic calcarious flood plain areas.

The main constraints to chickpea production in these areas are such diseases as collar rot (*Sclerotium rolfsii)*, wilt (*Fusarium oxysporum* f.sp. *ciceri*), botrytis gray mold (*Botrytis cinerea*), and dry root rot (*Rhizoctonia bataticola*). Uncertain rainfall during the flowering (Jan/Feb), podding, and maturity stages (Mar/Apr) make chickpea an unstable and uncertain crop. Farmers in these regions are gradually moving out of chickpea cultivation to grow other crops. The recently released varieties Barichhola 2 and Barichhola 3 are only resistant to wilt. Sources resistant to collar rot, root rot, or botrytis gray mold have not been found in the world germplasm collection at ICRISAT Asia Center. Chickpea cultivation will remain under perennial threat in these areas until disease-resistant varieties are developed.

Most of the 0.8 million ha of land in the Barind area of northwestern Bangladesh, remains fallow in the winter months after the harvest of the transplanted local aman (rainy-season) rice (Raisuddin and Nur-E-Elahi 1984). The major cropping pattern is fallow— aman rice—fallow (90%) where aman rice is sown in June/July and harvested in December. The Barind region receives a relatively low rainfall (1200-1500 mm), almost all of it during the rice-growing season. The low organic matter content (0.5%) of the soil, its plow pan, and its low pH (5.5-6) limit the uptake of nutrients and N-fixation by legume crops.

Chickpea trials in the Barind area by the Pulses Research Centre (PRC) and the On-Farm Research Division (OFRD) of BARI, indicate that yields of about 2.5 t ha^{-1} could be harvested with few additional inputs (Tables 1 and 2). In the Barind area chickpea must be sown by early November to ensure high yields. In order to sow early the local long-duration cultivars of rice need to be replaced by such short- duration varieties as BR 1, BR 14, TR 50, Ratna (Bangladesh-ICRISAT Barind Initiative 1991). The OFRD, Barind, has already developed the following alternative cropping pattern:

Green manure (GM) — aman rice - chickpea + linseed
(May–Jun) (Jul–Oct) (Nov–Mar)

In this pattern 60 kg P_2O_5 and 20 kg S ha^{-1} are applied in the GM which is comprised of daincha, or *Sesbania* sp), 40 kg N, 40 kg K, and 20 kg S ha^{-1} are applied to the rice, and no fertilizer is applied to the chickpea. Following this pattern, the organic matter content of the soil is increased and an additional 1.5 t ha^{-1} chickpea are obtained. This results in a marginal benefit cost ratio of 5.48 (Table 1).

As mentioned earlier, the Barind is a dry area, the lack of humidity does not encourage botrytis gray mold infestation. In the 1989/90 season most of the chickpeas growing in the traditional area were damaged by the rains which encouraged botrytis development during February to April. Experiments could not be harvested at Ishurdi, Jessore, or Faridpur but in the Barind 1.5-2.5 t ha^{-1} were harvested from breeding trials. Variety trials have been conducted at Barind locations to select suitable varieties for the area. The data from a 3-year varietal trial