Table 2. Evaluation of quantitative traits in 40 accessions of pigeonpea germplasm in Myanmar.

Descriptors	Range	Mean	SD	CV (%)
Plant height (cm)	78.3–192.0	133.3	16.6	12.4
Days to 50% flowering	96.0–167.5	125.7	9.7	7.7
Days to 75% maturity	145.5–199.0	168.1	7.0	4.2
No. of pods plant^{-1}	18.2–202.7	62.5	33.9	54.3
100-seed mass (g)	6.5–15.2	9.9	1.3	13.4

The data on 100-seed mass was interesting; the maximum seed mass (15.2 g) was recorded in the early-maturing accession ICPL 83024 (172 days) compared to 16.3 g in the long-duration check, local 5-seeded variety (217 days). However, the largest number of pods plant^{-1} was observed only in late-maturing accessions. Positive correlation between plant height and days to maturity was evident in this study. The evaluated data were documented and revealed for breeders to utilize in the national pigeonpea crop improvement program in Myanmar.

Pigeonpea Germplasm in China

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The landraces of cultivated types and their wild relatives offer a unique gene pool which plays an important role in the genetic improvement of crop plants. Therefore, enrichment of the gene pool should be a continuous process for the long-term benefit of the crop improvement programs. In China, although pigeonpea (*Cajanus cajan*) was introduced about 1500 years ago (Zhuojie 1997), it is not a major crop at present. The landraces of the crop, however, have been preserved and are still grown in various provinces of southern China. These include Yunnan, Guizhou, Hainan, and Guangxi where large extents of pigeonpea were cultivated until 1989 for lac production and fuel wood (Zhenghong et al. 1997). In addition, the crop also spread to some areas in Guangdong, Jiangxi, Sichuan, Fujian, and Hunan provinces. The traditional folk medicinal use of pigeonpea is still practiced by local farmers. In all the nine provinces, pigeonpea is maintained in hilly forests and in the backyard of some farmers. These landraces contain significant variation for different traits but so far there has been no systematic effort to collect, evaluate, and preserve this wealth of germplasm. Considering the importance and danger of losing these genetic materials due to introduction of new crops and clearing of forests, some attempts have been made by local scientists to collect pigeonpea landraces within their own province. This article summarizes the results of such efforts and the current status of pigeonpea germplasm in China.

In Yunnan Province, pigeonpea collection efforts were made by the scientists of the Institute of Insect Resources, Chinese Academy of Forestry, Kunming. The first pigeonpea collection mission was undertaken as early as 1960 in some areas of this province. About 20 landraces were collected, but there is no record of availability of this material at the institute and it was lost over a period of time. The second collection mission was undertaken sometime in 1980s. In this mission 28 landraces were collected and the documentation record of some of their agronomic characters is available. During 1996–98, the third pigeonpea collection mission was undertaken and 76 landraces were collected from 10 counties of Lincang, Cuxiong, Simao, and other prefectures. These germplasm lines contain a significant genetic variability for seed color, seed shape, flower color, and pod color (Table 1). The landraces of Yunnan Province with a life span of 5–10 years have been cultivated for a long time and are similar in maturity. The seed yield is around 35 g plant^{-1}. The variation among the landraces for color of flower, pod, and seed was significant. The flower color was red, yellow, or mixed. The variation in seed color was also large, and included white, cream, gray, dark brown, and variegated.

In Guizhou Province, pigeonpea germplasm was collected in 1987 from the adjoining areas of Guizhou and Guangxi provinces and it represented 10 counties located in the Nanpan river valley. Although the record

Table 1. Summary of pigeonpea germplasm collections in China.

Year	Area	Number of collections	Main characters
1960s	Partial areas in Yunnan	20	Material lost and no documents available.
1980s	Partial areas in Yunnan	28	Seed color: gray, brown, and speckle. Seed shape: round and oval.
1987	10 counties in Guizhou	Unknown	Flower color: red and yellow. Dry pod color: brown, drab, and blackish brown. Seed color: cream, blackish brown, and dark brown. Seed shape: round and oval. 100-seed mass: 8–10 g. Plant height: 3–6 m. Maturity: long duration.
1985–89	13 counties in Hainan	25	Seed color: gray, brown, black, and spot. Seed shape: round, oval, and rectangular. 100-seed mass: 4.5–11.7 g. Maturity: long duration.
1991–95	5 counties in Guangxi	12	Flower color: yellow. Seed color: brown and cream. Seed shape: round and oval. Plant height: 3–4 m. Maturity: long duration.
1996–98	10 counties in Yunnan	76	Flower color: yellow, red, and reddish yellow. Fresh pod color: green, purple, and streak. Seed color: white, cream, gray, brown, black, and speckle. Seed shape: round and oval.

of the genetic variation in the collection is available, the number of collections was not recorded. The material had large variation for important characters such as flower and pod color plant height, maturity, seed size, seed color, and seed shape (Table 1). The plant height in the germplasm varied between 3 m and 6 m, when perennial (1–4 years old) plants were measured. Plants with both red and yellow flower colors were found. The mature pod colors observed were brown, yellowish brown, and dark brown. The seed color of the material was cream, brown, or dark brown. The 100-seed mass was 8–10 g. Analysis of nutritional contents of whole seed samples showed that the protein content was 16–19%, lipid content was 1.5%, and starch content was 38.8–45.6%. The local landraces were commonly distributed in the river valley from the elevation of 380 m to 700 m. Most of the landraces were found growing in the hills and forests (Feijie et al. 1991, Julian and Xunsheng 1991).

In Hainan Province, 25 pigeonpea landraces were collected during a national crop germplasm collection mission in 13 counties. The collections were classified into two groups: yellow-flowered pigeonpea and double color-flowered pigeonpea. Most of the yellow-flowered pigeonpeas were short statured and early in maturity; the dorsal and ventral surfaces of the flowers were yellow. Matured pods were small, yellow-brown in color having 2–3 seeds. The seed color was cream with dark speckles. Most perennial pigeonpea landraces had mixed flower color. This group was characterized by high vigor, large plant size, late maturity, and yellow flower color with red stripes. The pods were brown or dark brown when mature, with 4–5 seeds per pod. The plant height was 1.5–3.5 m. The seeds were round or oval and black or light gray. Pigeonpea landraces in Hainan Province were found in marginal lands or in backyard gardens. Seed damage by insects was usually high.

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Performance of ICRISAT Pigeonpeas in China

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Introduction of pigeonpea (*Cajanus cajan*) materials from ICRISAT, Patancheru, India into China began in 1985 when a Pigeonpea Observation Nursery (PON) was grown at Guangzhou. This nursery consisted of a range of materials and its major objective was to obtain primary information about some basic adaptation parameters such as maturity and plant type. This information helps in decision-making in introducing more germplasm within the adapted plant types and maturity groups for more refined evaluation and selection. The PON, sown at the onset of the rainy season on 9 March revealed that the short-duration pigeonpeas were relatively better adapted than medium- and long-duration types. Yield of the short-duration lines was 1.0–1.2 t ha^{-1} while that of the medium-duration types was 0.3–0.9 t ha^{-1}. The local control (Fongsoon) flowered in 180 days and produced 0.65 t ha^{-1} yield. ICRISAT's long-duration lines were found to be extremely photoperiod sensitive and took more than 200 days to flower; they failed to produce grains.

As a follow-up, a set of 16 short-duration determinate lines were evaluated in 1988 in a replicated trial at Guangzhou. The trial was sown on 27 April at spacing of 65 × 33 cm. The 50% flowering in the test lines ranged between 54 days and 86 days. ICPLs 85033 recorded the highest seed yield of 2.03 t ha^{-1}, followed by ICPLs 86010, 86005, 87, 84037, and 83024 (Table 1). The local check took 115 days to flower and produced significantly low yield (0.37 t ha^{-1}).

In spite of demonstrating high yield potential and good adaptability in Guangzhou, the follow-up research and development activities on short-duration pigeonpeas could not be continued due to various unavoidable reasons. After a gap of 10 years the interest in ICRISAT's pigeonpea was revived but this time it was in Guangxi and Yunnan provinces. At the Guangxi Academy of Agricultural Sciences, Nanning in Guangxi Province the main research emphasis was on fodder production, grazing, and soil conservation while at the Institute of Insect Resources, Chinese Academy of Forestry, Kunming the prime aim was to exploit the potential of pigeonpea for soil conservation.

In 1998, 18 advanced pigeonpea breeding lines were evaluated in rainy season at Nanning in Guangxi province. The unreplicated trial was sown on 22 April in four-row plots. The spacing between and within rows was kept at 100 cm and 50 cm respectively. ICPL 90011 did not germinate. Data on various plant and seed characters were recorded on plot basis. Based on maturity the genotypes were classified into three groups: short duration (130 days), medium duration (180–250 days), and long duration (>250 days). In general short- and medium-duration lines were compact, short in height, and uniform in flowering and podding. The long-duration types were tall and spreading. All the lines were susceptible to *Helicoverpa* and *Maruca* pod borers and blister beetles. The local check was very late and spreading and produced a lot of biomass but low seed yield. Based on their performance ICPLs 90008, 93012, 93047, 93081, 93092, 87091, 87119, and ICP 7035 were selected for further testing.

Evaluation for Biomass Production

In parts of southern China, characterized by high rainfall of about 1000 mm, pod borer damage to pigeonpea is extensive due to high temperature and high humidity. Even 3–4 sprays of Chloropyriphos 20 EC at 300 ml ha^{-1} are not effective. In such areas, however, pigeonpea not only