

grows at a faster rate but also produces large biomass of fresh leaves and tender branches. Hence, pigeonpea can be used as a fodder and pasture crop for goat and buffalo. In 1999 cropping season short- and medium-duration pigeonpea lines and a local check were evaluated for biomass production in Nanning in unreplicated plots. Sowing was done on 20 April. Inter-row spacing was 100 cm while plants within the row were spaced at 40 cm. ICPL 88009 was the earliest (100 days to flower). The local check took about 8 months to flower. ICPL 85010, ICPL 93047, ICPL 87119, ICP 7035, and local check produced more than 50 t ha⁻¹ fresh biomass and about 25–30 t ha⁻¹ of dry biomass. The data also indicated that in comparison to local check, ICRISAT lines were more efficient in dry and fresh mass accumulation rates. The promising lines from this material will be selected for more detailed studies in agronomy, feeding, and multiple cutting trials in the next season.

During 1999 cropping season, two ICRISAT pigeonpea lines ICPL 90008 and ICPL 87091 were evaluated for fodder and seed yield in Duan county in Guangxi Province (Figs. 1 and 2). The plantings were done at two locations, one representing high mountain slope and another flat lowland. These lines were sown at the beginning of rainy season on 20 April and towards the end of rainy season on 10 July. The lines took more time to flower and the plants were more vigorous in early sown (April) than late sown (July) crops. In lowland, ICPL 87091 took more time to flower and mature and produced more biomass than ICPL 90008.

Soil Conservation

The Institute of Insect Resources of the Chinese Academy of Forestry, Kunming tested a number of ICRISAT germplasm lines for soil conservation in Yunnan Province. From these, six lines were identified for large-scale field evaluation in agroforestry, intercropping, and coverage of slopy lands.

The newly developed ICRISAT pigeonpea lines have shown great promise for monocropping and intercropping systems in China. At present Guangxi and Yunnan provincial governments have developed elaborate plans to multiply seed of the promising lines and conduct a series of on-farm trials in the counties where high levels of soil erosion and drought do not permit the cultivation of other food legumes economically.

Wild Relatives of Pigeonpea in China

K B Saxena¹, L J Reddy¹, Yang Shiyong², Zong Xuxiao³, Li Zhenghong⁴, and Zhou Chaohong⁴
(1. International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru 502 324, Andhra Pradesh, India; 2. Institute of Crop Germplasm Resources, Guangxi Academy of Agricultural Sciences, Nanning, China; 3. Institute of Crop Germplasm Resources, Chinese Academy of Agricultural Sciences, Beijing, China; 4. Institute of Insect Resources, Chinese Academy of Forestry, Kunming, China)

Wild relatives play an important role in the genetic improvement of cultivated crops. Breeders turn their attention to the wild relatives of crops after unsuccessful search for some unique trait in the cultivated germplasm. According to van der Maesen (1986) the genus *Cajanus* has 32 species. Of these, the Indian subcontinent harbors 18 species. ICRISAT has the global responsibility of collection, maintenance, and evaluation of germplasm of the wild relatives of pigeonpea. At present a total of 213 accessions, representing 20 *Cajanus* species are conserved for use in the breeding programs.

China is known for maintaining high level of biodiversity of different crop species. But the collection and evaluation of pigeonpea and its wild relatives has been rather limited. In ICRISAT's global germplasm collection of wild species none is of Chinese origin. van der Maesen (1986), while reviewing the taxa that are closely related to pigeonpea, listed six species which were found earlier by various researchers in China. The detailed description of these species with respect to their distribution and morphology is given by van der Maesen (1986) in his monograph. For quick reference a brief description of these species is given below and the key for identification is given in Table 1.

Cajanus crassus (Prain ex King) van der Maesen

Cajanus crassus is distributed in India, Myanmar, Thailand, China, Vietnam, Philippines, Java, and Malaysia peninsula. In Myanmar, it is locally called Pe yaing or Taw pe. In China it has been reported to be found in Yunnan Province in Manhao prefecture, Tonkinensis, Manpau, Red River Valley, middle part of E Mount Poo Peng, and on Babien-Ho between Talang and Puorl.



Cajanus crassus is a perennial climber. Leaves are dark, pinnately trifoliate, and lower surface of the leaflets is pubescent. Racemes are crowded and corolla yellow. Calyx is pubescent with short hairs. Pods are sturdy and oblong (2.5–5 cm in length) and contain 5–6 rectangular, rounded, black or cream colored seeds.

Cajanus goensis Dalz.

Besides China, *C. goensis* is found in a number of Asian countries. In China it is reported to occur in Yunnan Province. The areas where this species has been located are Szemao mountain, Yu Lu mountain, Haba Snow Range and between Manua and Mantung near Teshelo/Kenghun on Mekong River. It is generally found at 1000–1300 m altitude and flowers in September. In Myanmar it is called Ioe htun. According to Rama Rao (1914), *C. goensis* is a good herbal medicine. A decoction of root powder is suitable for curing rheumatism, biliousness, impurity of blood, fever, heat, and swelling. It also improves vitality, increases phlegm, and constipates bowels.

It is a perennial climber with long sticky, brown hairs on almost the entire plant. Leaves are pinnately trifoliate with long petioles. Leaflets have prominent ribs. Racemes are lax and pubescent. Pods are curved or straight, narrowed to both ends, and covered with long hairs. Seeds are broad and light brown in color with black mosaic.

Cajanus grandiflorus (Benth. ex Bak.) van der Maesen comb. nov.

In Chinese language *C. grandiflorus* is called Siao Cho Ten or Siao Ko Ten. Besides China, *C. grandiflorus* is also found in India and Bhutan. In China it is reported to be found in several areas of Yunnan, Kweichow, and Anhwei provinces. In Yunnan province *C. grandiflorus* is present in Hinyu-hien, La Long Tan, Teng Chung, west bank of Shweli-Salween divide, and Mount Mangtze. *Cajanus grandiflorus* is a climber with branches covered with hairs. Leaves are pinnately trifoliate with membranous leaflets. Racemes are lax with yellow flowers. Pods are 3.5–5 cm long and covered with hairs. Seeds are round and compressed.

Table 1. Key to wild *Cajanus* species reported in China.

| | | |
|-----|---|---------------------------|
| A. | Erect shrubs. | |
| | Leaflets rounded-obovate, whitish below, pods 4–6 seeded. | - <i>C. niveus</i> |
| AA. | Climbling or creeping plants. | |
| B. | Leaflets small. | |
| | Leaflets elliptic or obovate-obtuse, twiner in grasses. | - <i>C. scarabaeoides</i> |
| BB. | Leaflets large. | |
| C. | Flowers large. | |
| | Corolla persistent calyx with bulbous based hairs. | - <i>C. grandiflorus</i> |
| CC. | Flowers small. | |
| D. | Corolla not persistent. | |
| | Indumentum fine, spreading, green, bracts very hairy. | - <i>C. goensis</i> |
| DD. | Corolla persistent. | |
| E. | Leaflets semi-coriaceous. | |
| | Leaflets densely gray, hairy below, end leaflets longer than broad, pods 8–10 seeded. | - <i>C. mollis</i> |
| EE. | Leaflets coriaceous. | |
| | Leaflets brown, pubescent below, end leaflets broader than long, pods 3–5 seeded. | - <i>C. crassus</i> |





Figure 1. *Cajanus scarabaeoides*, a wild relative of pigeonpea found in bushes of Guangxi province in China.

***Cajanus mollis* (Benth.) van der Maesen comb. nov.**

Cajanus mollis is distributed in various countries located in the Himalayan foothills. In China, it has been reported in Szemao mountain, Mapan and Red River Valley in Yunnan Province. It is a perennial climber with very long branches. Leaves are trifoliolate with soft leaflets and prominent ribs. Racemes are short and crowded. Pods are sturdy and oblong ends rounded, 3.5–4.5 cm long and densely puberulous. Seeds are ellipsoid to rectangular in shape and whitish in color.

***Cajanus niveus* (Benth.) van der Maesen comb. nov.**

Cajanus niveus has been reported from several locations in Myanmar and Yuenkiang and Ue mountain of Yunnan Province in China. This species is an erect perennial shrub with green pubescent grayish branches. Leaves are pinnately trifoliolate; leaflets are covered with dense pubescence and have prominent ribs. Racemes are short. Pods are oblong, obtuse at both ends, and covered with hairs. Seeds are cylindrical with very large strophiole.

***Cajanus scarabaeoides* (L.) Thouars**

Cajanus scarabaeoides is widespread in Asia. In China, it is called Shui Kom Ts'o and found at altitudes from sea level to 1000 m. In Yunnan Province it is endemic in Yang Tse Ferry near La Ka Triang between Yunnansu and Huili while in Hainan it has been found growing in

Wanning. It is useful in pastures (Dabadghao and Shankarnarayan 1973). Kirtikar and Basu (1933) reported that *C. scarabaeoides* is effective against diarrhea in cattle. In August 1999, the authors found this species growing in the wastelands at 180 m elevation in Tiandong County of Guangxi Province in China (Fig. 1). At this location, plants of different ages ranging from young seedlings to perennials were found. Some plants were in podding stage.

In addition to the six species described, a new species was observed in 1999. The authors while monitoring pigeonpea trials in Guangxi province located a few plants (3–4 years old) of a wild relative of pigeonpea growing in the backyard of a farmer in Fengshan County of Guangxi province at 810 m altitude. In August the plants were at early flowering stage. According to the farmer the plants of this species were grown as a hedge crop around his house for several years but only few survived grazing. Based on the perennial habit, general morphology, leaf shape, and open branching habit, this species was suspected to be *C. cajanifolius*, the putative progenitor of pigeonpea. However, the critical seed characteristics, such as seed color and presence of strophiole could not be examined as the plants were in early flowering stage. It is important to revisit this location to confirm that the species is *C. cajanifolius*.

Among the wild species so far reported to occur in China, only *C. scarabaeoides* can be crossed freely with pigeonpea. It is, therefore, suggested that the samples of these species be collected and evaluated in China for various economic traits for use in the breeding program, if necessary.

References

Dabadghao, P.M., and Shankarnarayan, K.A. 1973. The grass cover of India. New Delhi, India: Indian Council of Agricultural Research. pp. 109–190.

Kirtikar, K.R., and Basu, B.D. 1933. Indian medicinal plants. Volume 1. pp. 809–811.

Rama Rao, M. 1914. Flowering plants of Travancore, Trivandrum. 127 pp.

van der Maesen, L.J.G. 1986. *Cajanus* DC. and *Atylosia* W.&A. (Leguminosae). Agricultural University Wageningen Papers 85–4 (1985). Wageningen, the Netherlands: Agricultural University. 225 pp.

