

# Hybrid pigeonpea – a way forward towards self sufficiency in pigeonpea production in India

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## Summary

In spite of their good nutritional profiles and extensive use in the staple diets of millions of people, most pulses produce low and unstable yields on farmers fields. Therefore, these crops are generally relegated to low fertility rainfed fields. Although pulse production in the last few decades has recorded positive growth, it is not enough to meet the ever growing domestic requirements. Therefore, raising the production and productivity of pulses has been a challenge to the scientists and policy makers.

Red gram or pigeonpea [*Cajanus cajan* (L.) Millsp.] is one of the major pulse crops in India. Its productivity (yield/ha) in the last half century has not changed in spite of intensive breeding efforts and releasing over 100 varieties. Being a mandate crop of International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), its scientists, in collaboration with ICAR and private sector seed companies (including MAHYCO) initiated a well planned research using a non-conventional hybrid breeding approach of developing a hybrids in pigeonpea. To achieve success in this endeavor, it was essential to breed a stable cytoplasmic – nuclear – male -sterility (CMS) system, which in combination with natural out-crossing, could help in producing commercial pigeonpea hybrids.

The breakthrough in “Hybrid Pigeonpea” was achieved in 2008, culminating more than 3 decades of dedicated research by a multi-disciplinary team of scientists. During this period five different CMS systems were developed using wild relatives of pigeonpea. Of these, the CMS system derived from *C. cajanifolius* (designated as A<sub>4</sub>) in 2005 was the best. To develop hybrids suited to diverse environments (meaning different maturity growth), this male-sterility was transferred to diverse female lines (in different maturity duration) through

back crossing. Simultaneously, an efficient large-scale seed production technology for hybrids and their parents (male and female line) was also developed.

In the last three years over 500 experimental hybrids have been tested in early and medium maturity durations in on-station and multilocation trials, and several hybrids demonstrated significant (30 - 100%) hybrid vigor for seed yield over the best control variety. High yielding hybrids had more biomass, number of primary and secondary branches, and pods per plant. The most promising medium maturity duration hybrid available at present is ICPH 2671. In multilocation and on-farm trials this hybrid has given over 30 - 40% superiority over the ruling variety Maruti. Besides high yield, this hybrid has high level of resistance to wilt and sterility mosaic diseases. ICPH 2671 also performs well under moisture stress conditions and suitable for intercropping. ICPH 2671 was launched for commercial cultivation by a private seed company on 15 July 2008 as “Pushkal” meaning “plentiful” in Sanskrit language. In 2007, approximately 20,000 kg seed of hybrid ICPH 2671 was produced by ICRISAT and partners. This seed was sown in on-farm demonstrations on over 5000 ha in the states of Maharashtra, Karnataka, Andhra Pradesh, and Madhya Pradesh. The other high yielding hybrids with yield advantages of 40-100% are ICPH 3371, ICPH 2470, ICPH 3491, and ICPH 3497.

The next major task before us is to take this technology to the doorsteps of farmers. This important activity is being undertaken by ICRISAT with the help of 22 private and four public (Mahabeej, NSC, SFCI, APSSDC) seed companies and ICAR/SAU partners. ICRISAT has trained over 200 scientists, seed producers, and technicians on various aspects of research and hybrid seed production. The promotion of hybrid technology in India is also being supported by National Food Security Mission (India). The hybrid pigeonpea technology has shown potential for a breakthrough in yield and with the support of our partners we are confident that the farmers will reap the benefits of this technology.