

Taking Pigeonpea Hybrids to the Door steps of Farmers

Project Goal:

To increase pigeonpea production in some major pigeonpea growing areas of India.

Project Objectives:

- To increase pigeonpea production through the adoption of hybrids under diverse environments.
- To increase pigeonpea productivity by promoting high-yielding hybrids.
- To demonstrate the yield potential of pigeonpea hybrids in different cropping systems in different pigeonpea growing areas.
- To empower farmers in seed production of pigeonpea hybrids and their parents.

Project Partners:

- **ICRISAT**

Universities:

- **MAU, Parbhani, Maharashtra**
- **UAS, Dharwad, Karnataka**
- **GAU,SK Nagar**
- **PDKV, Akola**

Seed organizations:

- **National Seeds Corporation**
- **State Farms Corporation of India**
- **State Seed Corporation Maharashtra**
- **Karnataka State Seeds Corporation Ltd**
- **AP State Seeds Development Corporation Ltd.**

Others:

- **Departments of Agriculture of Maharashtra and Karnataka**
- **Farmers' orgnizations**

Project Outputs and Activities:

Output 1: Multilocation on-station and on-farm evaluation of available hybrids

Activities: 1.1. The available experimental hybrids will be evaluated on station to identify specially adapted elite pigeonpea hybrids

A total of 248 pigeonpea experimental hybrids were evaluated in 25 trials during 2008 season. Of these, 51 short-duration hybrids were evaluated in six trials and 167 medium-duration hybrids evaluated in 19 trials at ICRISAT, Patancheru.(Table A) Some of these hybrid combinations are very promising due to their disease reaction. Simultaneously, these hybrids were also grown in disease nursery. Based on disease reaction and high-yield, the best hybrids will be identified in this season.

1.2. Multilocation testing and on-farm evaluation of the selected hybrids will be undertaken in different agro-ecological regions.

Based on the performance of multilocal evaluation elite pigeonpea hybrids will be identified for different ecological zones and on-farm trials will be conducted in the same zones to confirm available information. During this season, ICPH 2671 a promising medium-duration hybrid was in on-farm trials in Maharashtra, Karnataka and Andhra Pradesh.

In Karnataka, 69 demonstrations were distributed from ARS Gulbarga to the farmers of Gulbarga, Bidar, Dharwad and Bijapur districts between June-August, 2008. Due to delayed monsoon farmers has taken up sowings in 1st week of August. A few farmers have sown demonstrations of ICPH 2671 during June last week with protected irrigation. About 350 kg seed of ICPH 2671 was provided to watershed management in Karnataka state. Details are awaited. (list enclosed)

In Maharashtra, 90 farmers have received the seed of ICPH 2671 for on-farm demonstrations (list enclosed) between 10th – 14th June, 2008. These include Kanzara, Khinkhed, Kamtha, Balapur, Dhanora and Nimbha villages of Akola district. Fifty six farmers in Solapur district (list enclosed) received this hybrid seed 25-27 June, 2008. At both the locations sowings were delayed due to late arrival of monsoon.

In Andhra Pradesh a total of 59 farmers were given the seed of ICPH 2671 for demonstrations (list enclosed). The locations include Dokur, Aurepalli and Nallavari palli of Mahabubnagar district.

Output 2: Large quantities of seed of elite pigeonpea hybrids and their parents produced

Activities: 2.1. Elite pigeonpea hybrids will be identified for different ecological zones.

Thirty-eight elite short- and medium-duration pigeonpea hybrids were evaluated in 4 trials at 10-16 locations (Table B). Of these medium-duration hybrids evaluated in three trials at different locations. Based on their performance best hybrids will be identified and on-farm evaluation will be done further for different ecological regions.

2.2. Develop locally adapted economical seed production technology of hybrids and their parents.

At present 4 Female:1Male line combination was used in the seed production of hybrids at ICRISAT, Patancheru. The satisfactory yield levels harvested at Patancheru. But at different locations different row ratios were used such as 3F:1M and 2F: 1M and seed production in inter cropping etc., The economical row ratio will be identified based on the results. This will pave the way for fine tuning of technology.

2.3. Customized agronomic practices worked out for specific environments for maximizing yield of hybrids and their parents.

At ICRISAT Patancheru studies were initiated on the potentiality of hybrid pigeonpea medium duration in producing breeder seeds and hybrid seed production in response to growth rate, biomass production, and yield thru different planting distances. The different treatments under testing for AX B and AX R of ICPH 2671 are –

For 4:1 and 3:1 Ratio

Red soil (A XB)	Black soil (AX R)
T1 - 75 cm x 30 cm (control)	T1 – 75 cm x 30 cm
T2 - 75 cm x 50 cm	T2 – 75 cm x 50 cm
T3 - 75 cm x 75 cm	T3 – 75 cm x 75 cm
T4 - 75 cm x 100 cm	T4 – 150 cm x 30 cm
T5 - 150 cm x 30 cm	T5 – 150 cm x 50 cm
T6 - 150 cm x 50 cm	T6 – 150 cm x 75 cm
T7 - 150 cm x 75 cm	
T8 - 150 cm x 100 cm	

In addition, the studies will look into the efficient use of irrigation with respect to water availability during the different growing stages. Both parameters will examine the economic benefits for producing hybrid pigeonpea seeds.

Frequency of Irrigation

F1 - normal irrigation (control – as the needs arise)

F2 - every 2 weeks

The two phases in producing hybrid seeds (breeder seeds and hybrid seed production) are very critical in coming up with the highest quality seeds in terms of purity and productivity.

Pigeonpea hybrid ICPH 2671 was intercropped with sorghum at different planting distance on black soil. Where planting distance of sorghum 75 X 12 cm and 60 x 15 cm

The variable spacing were used in pigeonpea hybrid. The different combinations are -

T1 – 60 cm x 30 cm

T2 – 60 cm x 50 cm

T3 – 60 cm x 70 cm

T4 – 75 cm x 30 cm

T5 – 75 cm x 50 cm

T6 – 75 cm x 70 cm

This study will provide us the capacity to what extent the medium-duration hybrid will react towards intercropping with sorghum at different planting distances towards growth rate, biomass production, and yield.

Similarly, this activity will be done in collaboration with participating universities and public sector units.

2.4. Large-scale seed multiplication of hybrids and their parents will be undertaken at selected locations in collaboration with seed companies.

With collaboration of participating seed organizations such as NSC, APSSDC, SFCI, MSSCL and JNKVV farm, Jabalpur, large-scale seed multiplication is also planned. The seed produced in this large-scale multiplication will be useful in subsequent seasons. Based on planting area details future planning will be done.

2.5. Links with seed laboratories will be developed to identify various quality parameters of hybrid seed production.

In order to maintain sustainable crop production through hybrids, maintaining the purity of hybrid seeds is essential to get the maximum available heterosis in the hybrid. Purity testing in field by the conventional grow out test (GOT) is time taking and labor intensive process. Therefore, molecular marker kit is being developed for assessing the purity in hybrid seeds. After screening all available SSR markers on A-, B-, R- lines, a set of two markers has been identified that can be used to assess the purity in seed lots of the hybrid

(ICPH 2438). Similar kind of work is in progress for assessing the purity in other hybrids of pigeonpea.

Output 3: Making hybrid seed available to the resource poor farmers

Activities: 3.1. Farmer's Participatory Hybrid Selection Programs will be organized for target regions of Karnataka and Maharashtra and farmers' preferred hybrids will be selected.

The farmer's participatory hybrid selection program will be organized with the collaboration of participating universities such as MAU, Parbhani, Maharashtra, PDKV. Akola and UAS, Dharwad, Karnataka. In this activity farmers will be given a chance to indicate their preference which helps us in identifying the farmer preferred hybrids in specific location. The trials and demonstrations are already planted in the respective locations and at the time of harvesting farmers will given an opportunity for selection. At present we are evaluating the promising medium-duration hybrid ICPH 2671 'Pushkal' at different locations in Maharashtra, Andhra Pradesh and Karnataka.

3.2. Seed production officers and farmers will be trained in hybrid seed production technology and parental line maintenance

Several farmers and seed production officers were trained earlier. As part of this activity 23 officers from NSC were trained on parental and hybrid seed production on 23rd July, 2008 at ICRISAT, Patancheru.

3.3. Links with various seed agencies developed to produce and market seeds of hybrids and their parents at reasonable rates.

Lot of area is under promising pigeonpea hybrid ICPH 2671 in this season in Gulbarga. The yields of hybrid will be 25-30% more than standard national check, but it has dark grain color. The traders may exploit based on grain color and influence on the grain rate in the market. Hence, we are planning to link with various seed agencies/mills to purchase the product directly from farmer. This will save farmer from the exploitation traders.

Output 4: An active research backup program will be implemented at ICRISAT and supported by the two universities.

Activities: 4.1. Existing experimental hybrids will be evaluated for yield and adaptation at ICRISAT, MAU, Parbhani and UAS, Dharwad.

As a part of project activity we are evaluating the hybrids developed by ICRISAT in this season at different locations. Based on the performance locally adapted hybrids will be identified. At the same time we are also planning to make hybrid combinations with promising local cultivars in

Parbhani and Dharwad. We jointly evaluate the hybrids from next season to identify best locally adapted hybrids for that region.

4.2. Existing A / B- and R- lines will be evaluated for stability and resistance to wilt and sterility mosaic diseases at ICRISAT, MAU, Parbhani and UAS, Dharwad.

The seed of A, B and R lines were shared with Parbhani and Dharwad to evaluate their stability. These lines were also evaluated in disease nursery to eliminate susceptible lines.

4.3. New A/B- and R- lines with resistance to wilt, sterility mosaic diseases and other agronomic traits will be bred.

The stability of new A/B and R- lines of A₄ system. For example ICPA 2039 and ICPA 2043 tested in several locations and zero pollen shedders in nucleus seed. This new cross combinations will be made by universities and ICRISAT using best local lines resistant to diseases with high-yield. The new combinations will be evaluated jointly. The best adapted hybrid to a specific or to other locations will be identified.

Output 5: Share knowledge through training, review meetings, and monitoring tours

Activities: 5.1. Training programs will be conducted each year for technical staff and farmers on different aspects of seed production, storage, and marketing.

As this is a new system frequent training programs for technical staff are planned in every season. A regular monitoring to their fields and training in their locations also conducted in the past. In a similar way to popularize the system a frequent trainings will be conducted at ICRISAT and in other places.

5.2. Hybrid seed production manual will be published in English, Marathi, and Kannada.

The hybrid seed production manual is available in English and will be translated to other languages such as Marathi and Kannada for the benefit of farmers by respective participating universities. In this manual some of the farmers experiences in seed production technology will also be included.

5.3. Package of practices published in English, Marathi, and Kannada.

The package of practices will also be published in all three languages.

5.4. Field demonstrations and farmers' field days will be organized.

This activity is also planned in ICRISAT and participating universities.

5.5. Six monthly / annual progress report will be submitted to the donor.

This is in progress.