

Improved Livelihoods from better Maize Breeding

GM-6 - A MAIZE VARIETY BRED BY PARTICIPATORY PLANT BREEDING

Gujarat Maize-6, a maize variety bred through participatory plant breeding involving the GAU (Gujarat Agricultural University, now Anand Agricultural University), NGO (Gramin Vikas Trust) in collaboration with CAZS, Bangor, UK (now CARIAD), and first released in Gujarat state of India in 2002, has been recognised for '**Best Cultural & Societal Impact**' category by Bangor University, UK at **Bangor University Impact Awards 2013**. Prof. John Witcombe received the trophy from the Vice Chancellor of Bangor University on behalf of the team.



In Gujarat, many low-resource farmers rely on maize for their staple food. The farmers grew landraces (traditional farmer varieties); and failed to adopt new varieties because they had never been offered suitable ones. It was then decided to go for breeding an appropriate variety by using novel participatory approaches - carefully determining what farmers need in a new variety and subsequent its testing in collaboration with farmers.



In line with the above, a new maize variety (GM-6) was bred and released in Gujarat in 2002 that was suitable for cultivation by resource-poor farmers in western India (Witcombe et al. Exp Ag. 2003). Earlier, these farmers grew maize on poor soils with little or no fertilizer in highly drought-prone areas. Hence, cultivating maize was precarious but

GM-6 has reduced risk, increased yields, and improved food security.

GM-6 was further released in Rajasthan and Madhya Pradesh. It has been very widely cultivated, accounting for 80% of maize seed production in Gujarat since 2002. It has benefitted several hundred thousand farmers. Further innovations in the breeding methods were:

- Combining the higher yield of yellow maize with the preferred colour of white maize.
- Controlling pollination to increase genetic recombination and avoid inbreeding.
- Novel mass selection methods.

This pioneering use of participatory plant breeding and varietal selection produced maize variety, GM-6, the first modern variety ever to be adopted by these low-resource farmers. Since its release in 2002, nearly 2000 tonnes of GM-6 foundation and certified seed were produced. This accounted for over 80% of the seed production for all climatic zones of Gujarat and 100% of seed production for drier zones (source Gujarat State Seed Certification Agency).



GM-6 has improved the livelihoods of at least 300,000 poorest farming households in Gujarat. By 2012, scientists from GAU estimated (from seed production statistics and research on rates of adoption and seed distribution) that it has been grown on a cumulative area exceeding 2 million hectares. This cumulative area is still increasing, as GM-6 retains the largest share of maize seed production.

GM-6, in many research station and PVS yield trials, produced on an average about 20-30% more grain, depending on soil and drought conditions, than the best available alternatives. GM-6 gave these benefits without additional fertilizer or better management - a sustainability benefit as more grain is produced with the same inputs. The only additional cost for farmers (a small proportion of total costs) is buying GM-6 seed for the first time (farmers can use



harvested seed for several subsequent sowings). This has given an estimated total added value to farmers, to date, in increased grain yield, of ₹118 million. From field survey in three states of western India, food deficit households gained an extra one month of food self sufficiency while maize surplus households increased seed sales by 50%.

In addition, farmers said GM-6 reduced risks of crop failure because it matures before droughted conditions at the rainy season end - GM-6 is the earliest of all maize varieties grown in Gujarat. Farmers also liked its superior grain quality.