

Current Breeding Programmes in Pepper

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Over 75 varieties of pepper are being cultivated in India, among which Karimunda, Kalluvally and Balankotta are popular in Kerala and Malligesara and Doddigya are popular in Karnataka, besides Panniyur I, a hybrid between Uthirankotta and Cheria Kaniyakadan. Panniyur I is the only hybrid pepper evolved from programmed breeding research in this country. This hybrid is outstanding in its yield potential. Average yield is reported to be about three times that of the popular North Kerala variety Kalluvally. Establishment of Panniyur I orchards in different regions of Kerala, Karnataka and to a limited extent, in Andhra Pradesh and large scale multiplication have resulted in extensive areas being brought under this hybrid variety. However, it cannot be taken for granted that Panniyur I will continue to yield high under all agro-climatic conditions. Our survey in different pepper growing regions in Kerala has indicated that the adaptability of the hybrid is not universal. For example, the hybrid has been observed to produce luxuriant vegetative growth, but gives only poor yield under excessive shade and at higher elevations. The percentage of light berries in Panniyur I has been reported to be about 10% as compared to only 3% in Karimunda. Also, it is not superior to local cultivars in tolerance to diseases and pests.

Among the established cultivars of pepper, Karimunda is the most popular among the growers in central Kerala. It is also popular with the processors. This cultivar has the capacity to yield uniformly even under adverse climatic conditions. It has lesser light berries compared to Panniyur I. The short spike length of Karimunda is compensated by the greater number of spikes per vine and the higher percentage of fruit set.

From the breeder's point of view, *Piper nigrum* has certain advantages like the presence of rich genetic diversity, largely cross fertilised nature, and heterozygosity, all of which could be exploited by programmed breeding. Clonal propagation makes it possible to fix hybrid vigour.

The centre of origin of pepper is assumed to be the forests of Western Ghats and survey conducted in the Karnataka Forests by the CPCRI has shown that there is rich genetic variability available for exploitation in berry size, spike length, percentage of female and bisexual flowers, percentage of dry to green pepper, non-volatile ether extract, volatile oil, crude piperine, crude fibre, starch and crude protein.

The Kerala Agricultural University has made a beginning, to survey and collect the natural variability available in the forests of

Kerala but the major areas in Kerala are yet to be surveyed.

Majority of the cultivated types of pepper are monoecious though variations from complete male to complete female have been reported. Protogyny in a majority of the cultivars suggests cross pollination. The pollination is assumed to be largely due to a combination of geitonogamy and rain drops.

The chromosome number in the cultivated varieties has been reported to be $2n = 48, 52$ and 128 . Intracloonal variation in chromosome numbers has also been observed and this is to be expected under large scale vegetative propagation. The reported chromosome numbers indicate polyploidy even among cultivars. The study of seedling population from individual cultivars, has shown wide variation for morphological characters indicating heterozygosity. This, combined with polyploidy, offers considerable scope for selection.

Quick wilt and slow wilt of pepper are becoming increasingly serious problems in parts of Kerala. It is necessary to locate resistance/tolerance to these diseases. None of the cultivars is found to be resistant to *Phytophthora* causing quick wilt, though two wild species, i.e. *Piper colubrinum* and *Piper obliquum* are reported to be resistant to *Phytophthora* in Indonesia and Sarawak. It is necessary to screen the available germplasm for resistance to this

pathogen and transfer resistance to the cultivated types.

Taking into consideration the above points, a breeding programme has been initiated at CPCRI Regional Station, Calicut to evolve improved varieties of pepper with respect to yield, quality and resistance.

The available germplasm collections are being evaluated for their yield and associated characters, quality aspects and tolerance to diseases and pests. The programme envisages raising about 20,000 seedlings every year either from open pollinated seeds of popular cultivars or from appropriate crosses made for combining desirable characters. About 5-10% vigorous seedlings among them are transplanted in the field. The unselected seedlings are screened against *Phytophthora* by inoculation. Seedlings showing relative tolerance at this stage are also transplanted in the field. The clonal multiplication, initial evaluation and screening against *Phytophthora* and nematodes will run concurrently. The final selection will be based on yield and quality against Panniyur I and Karimunda, and tolerance to diseases and pests.

The current pepper breeding programmes offer considerable scope and hope for evolving improved varieties with respect to yield, quality and resistance. We are fortunate that the centre of origin is in this region and the untapped genetic variability available for exploitation is tremendous.