

CURRENT BREEDING PROGRAMMES IN PEPPER

M.K. Nair

Over 75 varieties of pepper are being cultivated in India among which Karimunda, Kalluvally and Balankotta are popular in Kerala and Malligasara 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 yields are reported to be three times that of popular North Kerala variety 'Kalluvalli'. 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 the 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 have luxuriant vegetative growth, but yields were poor under excessive shade and at high elevations. From the commercial point of view, 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. From the processor's point of view, the cultivar has lesser light berries compared to Panniyur I. The short spike length of Karimunda is compensated for 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 rich genetic diversity available largely cross fertilized and heterozygous types which could be exploited by programmed breeding. The clonal propagation makes it possible to fix hybrid vigour, obviating the necessity for continuous seed production.

The centre of origin of pepper is 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. The collection has shown wide variations in berry size, spike length, percentage of dry to green pepper, percentage of female and bisexual flowers, 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 area in Kerala is 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 . Intra clonal 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 offer considerable scope for selection.

Quick wilt and slow wilt of pepper are becoming increasingly serious problems in parts of Kerala and

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 effected for combining desirable characters. Five to ten percentage vigorous seedlings among them are transplanted to the field. The unselected seedlings are screened against Phytophthora by inoculation. Seedlings showing relative tolerance at this stage are also transplanted to the field. The clonal multiplication, initial evaluation and screening against Phytophthora and nematodes will run concurrently. The final selection will be based on yield performance and quality in comparison with Panniyur I and Karimunda and tolerance to diseases and pests.

The current pepper breeding programmes offer considerable scope and hope for evaluation of 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.