

BIOCHEMICAL, CYTOLOGICAL AND YIELD CHARACTERISTICS OF
Piper nigrum AND ALLIED SPECIES

By

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ABSTRACT

Studies were made on the leaf characteristics, yield and quality components, and on the chromosome behaviour of the different species of the genus Piper, including the two introduced cultivars Panniyur-1 (from India) Kuching (from Malaysia), their reciprocal hybrids and nine local selections of Piper nigrum. Further, the percentage of berry setting at the inter and the intraspecific levels were observed for P. nigrum and P. sylvestre.

D^2 and canonical analysis showed the presence of high genetic diversity among the different species of the genus Piper, where piperine contributed 85% for this variability. Presence of Panniyur-1 (from India), Kuching (from Malaysia) and two Sri Lankan selections of P. nigrum in one cluster highlights the fact that the genetic variability has not been markedly affected by the geographic origin of the cultivars. Clustering of the nine local selections of P. nigrum into four different groups showed that there was a high genetic variability among the cultivars and selections. The high genetic coefficient of variation observed for yield and quality components indicated high selection range for these characters which in turn had high heritability. Yield improvement can be achieved by direct selection of yield components such as number of secondaries, berry weight and oleoresin content. The indirect effects of spike length, internodal length, leaf area, oil percentage and piperine percentage on yield via other characters were more important than their respective direct effects.

A high plant to plant variability was observed in the F_1 hybrid of the reciprocal crossings of Panniyur-1 and Kuching. Heterosis and heterobeltiosis were observed in $K \times P_{77}$ and $K \times P_{63}$ for all the characters. $K \times P_{27}$ was the only hybrid which showed favourable positive significant heterosis for spike length. All the hybrids showed favourable negatively significant heterosis and heterobeltiosis for internodal length.

The normal meiotic behaviour observed with higher percentage of bivalents and tetrads in the cultivars and local selections of P. nigrum together with high percentage of berry setting at the intra- and interspecific levels indicates the possibility of crop improvement through breeding programmes.

High percentages of oil, oleoresin and piperine in the local selections of P. nigrum show that Sri Lanka genotypes are superior in quality.