

STUDIES IN GENUS PIPER

By

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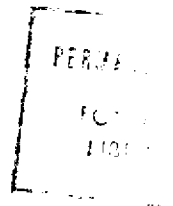
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## ABSTRACT

Collections of sixty nine accessions of wild and cultivated species of the genus *Piper* were made from different localities of Badulla, Colombo, Kandy, Matale, Matara, Nuwara Eliya and Ratnapura Districts. Wild species were collected mainly from the wet lowland forests and the montane forests, and the cultivated species were gathered from home gardens, from public sector estates and from private plantations. Herbarium samples of all collections were prepared and in addition cuttings of live specimens were brought to the Matale Research Station and propagated under nursery conditions. Of these forty two accessions were planted out in the field at the Research Station in three randomized replicated trials. These now form the largest germ plasma collection of the genus *Piper* in Sri Lanka. Determined largely by the availability of adequate material for sampling, twenty four accessions were selected for detailed study of floral characters, foliar morphology including epidermal features, chromosome number and the pattern of distribution of the phenolic constituents of leaves.

Based mainly on foliar and floral characters, the different accessions were identified as the following ten species: *P. agrophyllum*, Miq., *P. attenuatum*; Buck.Ham; *P. betle* L.; *P. chuvya*; *P. longum* L.; *P. nigrum* L; *P. sylvestre* Lam; *P. thwaitesii* C.D.C.; *P. trineuron* Miq. and *P. zeylanicum* Miq.. Morphological characters of leaves and flowers of samples collected from the different localities were compared with those of leaves and flowers obtained from plants growing at Matale and it was found that most of these characters,

including some quantitative characters were relatively stable. For examples, leaf shape and texture were not plastic and they are good taxonomic characters for characterisation of species of *Piper*. Sex composition of species of *P. nigrum* showed considerable variation while all the other species examined in this study were dioecious.

The form of epidermal cells as seen in paradermal sections ranged from rectangular cells with sinuous anticlinal walls to polygonal cells with somewhat straight walls. Variations in epidermal cell length was more marked than that of cell breadth. In all species of *Piper* stomata were confined to the abaxial epidermis. The hypostomatous condition is characteristic for the genus *Piper*. The guard cells exhibit anomocytic arrangement. The stomatal index was low in some species (3.8 - 5.5) while others had high values (9-10). Guard cell length also showed variations. Trichomes and mucilage cavities were present in some species but in general they were absent in most species of *Piper*. A combination of epidermal characters can be used to identify *P. longum*, *P. betle*, *P. chuvya*, *P. nigrum* and *P. trineuron*.

In all twenty different phenolic spots were detected on chromatograms but of these the spot designated No.7 was found in the leaf extracts of all ten species of *Piper* examined in this study and it appears to be a good chemotaxonomic marker for the genus. No one species, however, contained all the 20 different phenolic compounds. Besides this generic marker, species specific spots were found in *P. nigrum*, *P. betle* and *P. zeylanicum*.

Somatic chromosome numbers,  $2n = 26, 29, 52, 65$  and  $78$  were recorded for different species. Of these  $2n = 26, 39,$  and  $65$  are being reported for the first time. It is concluded that the basic number for the genus is  $13$ . Somatic numbers which are multiples of the basic number indicate presence of ployplloid races or cytotypes. Non-constancy of chromosome number was observed in the same root tip of some accessions.

The leaves and spikes of the tetraploids are thick and firm compared to those of the diploid progenitors. A positive correlation was found between chromosome numbers and mean guard cell length while a negative correlation exists between chromosome numbers and stomatal index values of the different species of *Piper*. Phenolic spot No. 2 was characteristic for tetraploid species and spot No. 5 was detected in all the diploid species.