

Research Article

Phenetic Analysis of Cultivated Black Pepper (*Piper nigrum* L.) in Malaysia

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Phenetic analysis of all the black pepper cultivars in Malaysia is crucial to determine the morphological difference among them. The objective of this study is to ascertain the morphological distinctness and interrelationships among the cultivars to ensure registration of each variety under the Plant Variety Protection Act, as a prerequisite toward implementation of a monovarietal farm policy in the future. Cluster analysis revealed that cultivars “Semongok Aman” and “Semongok 1” have high distinctness values for identification; thus, varietal diagnosis for the two cultivars is easy. Cultivars “Nyerigai,” “India,” “Semongok Perak,” and “Semongok Emas” were grouped in the most diverse clusters among the ten cultivars studied. The four cultivars have a similarity index as high as 92%; however, investigation of leaf width, leaf width-length ratio, seed weight, and conversion rate (fresh to black pepper) gives the ability to determine the characteristic differences. Cultivars “Lampung Daun Lebar” and “Yong Petai” have a similarity of 96%; however, the two showed distinctive differences in leaf width, leaf length-width ratio, spike thickness, and spike length characteristics. On the contrary, cultivars “Kuching” and “Sarikei” showed the highest similarity index, at 98%, and thus are among the most difficult cultivars to diagnose the morphological difference. However, the principle component analysis showed that the fruit size and seed diameter were the important diagnostic key characteristics. Overall, the leaf width, leaf width-length ratio, fruit spike, and conversion rate characteristics are among the key characteristics to differentiate among cultivars of black pepper in Malaysia. At the same time, the principle component analysis carried out has enlightened some interrelationships on the morphological characteristics between cultivars. This information is crucial for the future of the plant varietal improvement program in Malaysia.

1. Introduction

Black pepper, scientifically called *Piper nigrum* L. from the family of Piperaceae, is the most important spice in the world. In Malaysia, the crop has been highlighted as one of the national commodities based on its substantial contribution to the economy of the country. However, the production of black pepper has been diminishing since the early 1980s mainly due to pest and disease occurrence and labour constraints [1]. Thus, the government strategized a new policy to ensure sustainability of the industry by strengthening the quality of peppercorn. A monovarietal farm concept was believed to be able to strengthen the quality of peppercorn.

Black pepper germplasm assemblage has been established in Sarawak, Malaysia, since the 1980s. Since that time, there have been 47 accessions of black pepper varieties and 46 accessions of unidentified species of *Piper* [2]. In Malaysia’s current black pepper farms, most are multi-varietal and planted because farmers are unaware of monovarietal importance and lack knowledge on varietal identification. Based on a manual entitled “Pepper Production Technology in Malaysia,” released by the Malaysian Pepper Board in 2011 [3], seven cultivated varieties have been described as common cultivars, including cv. “Semongok Aman,” cv. “Semongok Emas,” cv. “Kuching,” cv. “Semongok Perak,” cv. “Uthirancotta,” cv. “Nyerigai,” and cv. “PN129.” However, in 2007, Sim reported the existence