

CHAPTER 5.0

GENERAL DISCUSSION AND CONCLUSION

Plants of the genus *Amorphophallus* have a long history of use in tropical and subtropical Asia as a food source and as a traditional medicine. However, in Malaysia, the plant is still considered as an underutilized plant and poorly documented. This study is conducted to investigate the ecological parameters and the economic potential of *Amorphophallus* spp. in terms of their glucomannan content.

Distribution of *Amorphophallus* spp. in Peninsular Malaysia from earlier records showed that there were 12 species, namely, *A. bufo*, *A. carnosus* syn. *carneus*, *A. elatus* syn. *variabilis*, *A. elegans*, *A. haematospadix*, *A. longituberosus* syn. *viridis*, *A. minor*, *A. oncophyllus* syn. *muelleri*, *A. paeoniifolius* syn. *campanulatus*, *A. perakensis*, *A. prainii*, and *A. sparsiflorus*. Throughout the study, only 6 species were successfully collected and documented. The species were *A. bufo*, *A. elatus*, *A. elegans*, *A. oncophyllus*, *A. paeoniifolius*, and *A. prainii*.

A. paeoniifolius and *A. prainii* were the most common species found throughout Peninsular Malaysia, implying that the two species can adapt to all kinds of environmental conditions including the various soil types of Peninsular Malaysia. The distribution of *A. bufo* was restricted to the wet and cooler regions of Cameron Highlands, while the distribution of *A. oncophyllus* was restricted to the northern parts of Peninsular Malaysia. The high endemism showed by *Amorphophallus* species has also been documented by Mayo et al. (1997) and Hetttersheid and Ittenbach (1996).

Of the 6 species of *Amorphophallus* collected for this study, at least 4 species (*A. paeoniifolius*, *A. prainii*, *A. elegans* and *A. elatus*) thrive in almost all states in Peninsular Malaysia. They can easily be found in disturbed vegetation or disturbed secondary forests. A detailed quadrat analysis of *A. paeoniifolius* and *A. prainii* in disturbed habitats in Jerantut, Pahang and Kuala Kangsar, Perak, respectively, showed that the two species well distributed under the canopy of orchard trees namely, *Durio*, *Nephelium*, *Artocarpus*, and *Lansium* indicating that they could grow well under cultivated orchard trees. Another study on Borneon *Amorphophallus* species by Angeline, unpublished MSc. thesis (2010), showed similar result, that *Amorphophallus* spp. in Borneo can also be found in disturbed secondary forests and under the canopy of durian (*Durio zibethinus*) and cacao (*Theobroma cacao*) trees.

The optimum growth of *Amorphophallus* spp. in Peninsular Malaysia was achieved when the humidity range was between 53 to 85 %; light intensity from as low as 500 Lux and as high as 2780 Lux; and temperature between 25-30 °C. A study conducted by Hettersheid and Ittenbach (1996) also stated that *Amorphophallus* spp. are easily grown in rich and aerated soil with optimum temperature 25 °C in a partially shaded spot with protection from direct sunlight (under plant canopy) especially during hours at midday.

Result from this study revealed that all *Amorphophallus* species found in Peninsular Malaysia were tolerant to soil acidity. They were found in areas with varying soil properties including soil texture, moisture content, available Ca, Mg, K and total P and organic matter indicating that all species were tolerant to all soils including the less fertile soil in Peninsular Malaysia. The results from the present

study is in agreement with the research carried out by Hettterscheid and Ittenbach (1996) which reported that the majority of *Amorphophallus* spp. are not very difficult to grow, provided minimum conditions are met. These are roughly a rich soil, the use of additional fertilizer, and little shading against direct sunlight.

During the period of this investigation, both *A. paeoniifolius* and *A. prainii* were abundant during the rainy season which occurred from November until March (North East Monsoon) 2009. However, they can also survive the hot and dry season by undergoing dormancy. The Importance Value (IV) of *Amorphophallus* spp. under orchard vegetation for instance in the experimental plot at Jerantut and Kuala Kangsar, varied considerably with seasons indicating that they could appear dominant during favourable period of the year and dormant when adverse condition prevailed. A study by Pitojo (2007) showed that under orchard vegetation, the dormancy phase of *Amorphophallus* spp. will take place when the leaf dies down after regular growing period during dry season.

The glucomannan (GM) content of the purified powder from four species, namely, *A. elegans*, *A. oncophyllus*, *A. paeoniifolius* and *A. prainii* were significantly different between species. The highest GM content was recorded from *A. oncophyllus* (58.65 %), followed by mature *A. paeoniifolius* (50.22%), mature *A. prainii* (29.71 %) and *A. elegans* (17.01 %) respectively. The GM content was lowest in young *A. prainii* (9.23 %) followed by young *A. paeoniifolius* (14.90 %). The GM content was high in matured corms than in young corms. These results are similar to that of Zhang et al. 1998 who stated that the concentrations of glucomannan in *Amorphophallus* spp. increase with growing time.

In conclusion, *Amorphophallus* species has a great potential to be commercialized in Malaysia. The plants can provide economic levels of glucomannan (GM) in the corm. They are easy to grow under the various types of soil and climatic conditions in Peninsular Malaysia. However, *Amorphophallus* species also require certain climatic and ecological conditions to develop the optimum GM content for commercialization, as has been discussed previously.

From the studies, several recommendations can be proposed. Species with appreciable and economic content of glucomannan e.g. *A. paeoniifolius* can be recommended for domestication. Moreover, since the plant thrives well under partially low light intensity, it could be possible to cultivate the plant under the canopy of palm oil, rubber or fruit orchards. There is no need for new areas for planting this crop. Similarly, it could be possible to domesticate *Amorphophallus oncophyllus* in the northern region of Peninsular Malaysia as in Perlis and Kedah. This species is indigenous to Thailand but can be found in the northern part of Peninsular Malaysia. Therefore, locations bordering the country should be suitable to grow this crop.

In view of the increasing demand for commercialization of underutilized plants in Malaysia, further research on *Amorphophallus* spp. and glucomannan (GM), could not only provide much needed knowledge on this important species, but could also be of considerable socio-economic impact.