CHAPTER 8
SUSTAINABLE CULTIVATION OF MUCUNA

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8.1 INTRODUCTION

Mucuna bracteata is a species of flowering plant in the family Fabaceae (the legume family). It is native to Southeast Asia and is found in countries such as Malaysia, Indonesia, Thailand, and the Philippines. *Mucuna bracteata* is a climbing vine that can reach lengths of up to 20 meters (65 feet) (Chiu & Goh, 2007). It has large, dark green leaves and produces blackish purple flowers that develop into clusters of bean-like pods. The pods contain seeds that are similar in appearance to the more well-known *Mucuna pruriens*, which is often used as a medicinal plant.

In traditional medicine, various parts of *Mucuna bracteata* are used for their potential health benefits. The seeds are sometimes used to support male reproductive health and vitality, while other parts of the plant are believed to possess antioxidant and anti-inflammatory properties (Sangvikar et al., 2016). However, it's important to note that scientific research on the specific medicinal properties of *Mucuna bracteata* is relatively limited compared to *Mucuna pruriens*.

Currently, *Mucuna bracteata* is widely used as cover crop species in rubber and oil palm plantation across the Southeast Asia and India regions (Figure 8.1) (Samedani et al., 2015). The utilisation of *Mucuna bracteata* as a cover crop in vast plantations is primarily dependent on the

use of seeds for planting purposes. Nevertheless, the supplies of seeds are limited whereas the germination rates of *Mucuna bracteata* seeds are low due to dormancy (Chee, 2007). It's worth noting that propagation through stem cutting is a viable option. However, this technique necessitates skilled personnel and the careful selection of premium materials (Lee et al., 2007).

Figure 8.1 *Mucuna bracteata* application as cover crop in oil palm plantations

Tissue culture effectively overcomes these challenges by directly initiating the growth of plants from explants, circumventing the reliance on seed germination. This approach offers a swifter and more efficient propagation process, which proves especially advantageous when a substantial number of plants are required within a limited timeframe. So far, tissue culture propagation of *Mucuna bracteata* has only been reported once by Abd Aziz et al. (2018). As such, the report serves as primary reference for this chapter unless otherwise stated.

8.2 SURFACE STERILISATION AND CULTURE INITIATION FROM SEEDS

Explant sterilisation is an essential step to prevent microbial contamination in tissue culture. Contaminants like bacteria, fungi, and other microorganisms can hinder the growth of cultures and compromise the entire propagation process. Various sterilisation techniques, such as using disinfectants and altering sterilisation durations, can be employed based on the type of explant and its inherent susceptibility to damage. So far, only seeds have been used as an explant to initiate culture in tissue culture propagation of *Mucuna bracteata*.

As *Mucuna bracteata* seeds are enclosed with thick layer of seeds coat, the seeds must be firstly scarified by submerging the seeds in concentrated sulfuric acid (98%) to break dormancy. Scarification can be achieved by submerging the seeds in concentrated sulfuric acid (98%), followed by agitation at 100 rpm for 30 min. The seeds are then rinsed with sterile distilled water at least five times. When the scarified seeds were treated with 95% (v/v) ethanol, 50% (v/v) Clorox and combination of 95% (v/v) ethanol and 50% (v/v) Clorox, there were no significant differences with non-treated scarified seeds. It is possible that scarification process of *Mucuna bracteata* seeds with the harsh concentrated sulfuric acid is sufficient to eliminate fungus or other contaminants. Nonetheless, it is important to maintain aseptic conditions throughout the process to prevent re-contamination.

Scarified seeds can then be cultured on double layers of cotton roll in a Petri dish, moistened with 10 mL of sterile distilled water, wrapped with Parafilm, and germinated in dark condition. At this stage, germinated seedlings are generally sterile and ready to be transferred onto nutrient rich medium for *in vitro* cultivation or used as an explant for *in vitro* shoot multiplication.