

## First record of basal stem rot of foxtail palm *Wodyetia bifurcata* caused by *Ganoderma boninense* in Malaysia

### ABSTRACT

*Wodyetia bifurcata* Irvine, commonly known as the foxtail palm, is a graceful palm species that has caught the interest of horticulturists and landscape architects due to the uniqueness of its foliage, fast growth, and lack of significant plant pests. In January 2016, a disease inspection carried out at the Royal Selangor Golf Club, Kuala Lumpur, found four foxtail palm trees infected by basal stem rot (BSR). In the field, the trees were observed to show pale green, wilted leaflets and collapsed fronds with only a single spear leaf remaining. At the base of infected trees, the presence of white fungal primordia, depression in outer bark, and necrotic symptoms were visible on basal stem bark. Dead tissues underneath the outer bark were obvious; the tissues were brown, rotten, and moist with the presence of white mottling mycelia. However, healthy tissues were found to be firm and cream in color. Rotten stem of the affected palm emitted a mushroom-like odor, brownish, dry, and friable, especially at the center. Diseased stems of a foxtail palm were cut and brought to Forest Research Institute Malaysia (FRIM) for isolation and identification of associated fungus. The fungus recovered from the diseased palm was identified as *Ganoderma boninense*. Macroscopic and microscopic observations revealed that pure culture of the fungus was white, dense, and felty to floccose. The generative hyphae were hyaline, septate, and thin-walled with clamps, whereas the binding hyphae were branched, thick-walled, without septation, and hyaline. Cuticular cells were spherical to irregular in shape, thick-walled, encrusted, and golden brown in color. Fruiting bodies of the fungus were tough and dimidiate form with light to dark brown, undulating, and laccate upper surface. Spores were ellipsoid measuring  $11.84$  to  $13.82 \times 7.72$  to  $9.72$   $\mu\text{m}$ , truncated, golden brown, and thick-walled with a rough surface. The identified fungus was allocated with reference number FRIM690. A pathogenicity test was carried out on seven healthy and uniform 2-year-old foxtail palm saplings obtained from a local nursery at Sg. Buluh, Selangor, according to the technique described in a previous study (Mohd Farid et al. 2005). Of these, two saplings were used for control. Prior to inoculation, the blocks were inoculated with *G. boninense* agar plugs. Control blocks were inoculated with sterilized PDA plugs. The test revealed that early symptoms of the disease infection were often yellowing, wilt, and drying of pinnae. It was then followed by collapse of fronds after all the pinnae had dried up. Finally, there was only a single shrunken spear left. In general, all the symptoms were visible between 16 and 40 weeks after inoculation. At the end of the experiment, all harvested symptomatic saplings brought to the laboratory successfully recovered *G. boninense*. For molecular identification, PCR amplification was carried out for the ribosomal DNA internal transcribed spacer (ITS) region with primers ITS1 and ITS4 (White et al. 1990). The amplicon was cloned, sequenced, and deposited in GenBank (accession no. KY352306). BLAST search showed 99% identity to *G. boninense* (KX092000; KF164430; AB985729). In conclusion, both morphological and molecular characteristics supported the identification as *G. boninense* Pat. To our knowledge, this is the first record of *G. boninense* causing BSR on foxtail palm trees. This disease threatens tree survival, and may potentially negatively affect landscape in urban areas.

**Keyword:** Basal stem rot; Foxtail palm; *Wodyetia bifurcate*; *Ganoderma boninense*; Malaysia