

**UNIVERSITI TEKNOLOGI MARA**

**THE INFLUENCE OF SELECTED  
HERBICIDES ON BASAL STEM ROT  
DEVELOPMENT AND INJURY  
SYMPTOMS ON OIL PALM  
SEEDLINGS**

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## ABSTRACT

The effect of herbicides used in oil palm plantation was evaluated for the herbicidal potential to control basal stem rot (BSR) development *in vitro*, *in vivo* and their phytotoxicity on oil palm seedlings. Out of eleven different herbicides were selected and tested for inhibiting the radial growth of *G. boninense* by using a poison agar technique which is potato dextrose agar media were incorporated with the selected herbicides. The effect of herbicides on oil palm seedlings were tested on 12 months old oil palm seedlings in the nursery to evaluate the injury symptoms on the seedlings. Based on the percentage inhibition of radial growth *G. boninense*, the most effective herbicides are paraquat dichloride, diuron and monosodium methylarsenate. Results of phytotoxicity symptoms on oil palm seedlings showed that triclopyr butoxyl ethyl ester has a potential to suppress the BSR development, however the herbicide can cause injury to oil palm seedlings as compared to paraquat dichloride and glyphosate monoammonium. These findings suggested that paraquat, glyphosate monoammonium and glyphosate isopropylammonium have potential to reduce and inhibit the severity of BSR in oil palm and the usage of triclopyr butoxy ethyl ester should be reduced to avoid injury symptoms on oil palm.

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# CHAPTER ONE

## INTRODUCTION

### 1.1 Research Background

#### 1.1.1 Basal Stem Rot Disease of Oil Palm

Basal Stem Rot (BSR) disease is the most devastating oil palm disease in South-east Asia including Malaysia (Obaidi *et al.*, 2014). BSR disease caused by *G. boninense* was first described in 1915 in the Republic of Congo, West Africa as a disease of senescing palms (Wakefield, 1920). The disease was first reported in Peninsular Malaysia by Thompson in 1931 and the cause of the disease was claimed by the author as *Ganoderma lucidum*. Besides Malaysia, BSR disease of oil palm is also reported in Indonesia in South-East Asia, Angola, Cameroon (Kinge *et al.*, 2011), Ghana and Papua New Guinea in Oceania (Turner, 1981; Tengoua and Bakoume, 2005).

Disease symptoms of BSR infection are varying depend on the age of palm, climatic conditions, soil temperature and soil types (Rees *et al.*, 2007). The authors found that the foliar symptoms usually occur when more than 50% radius of basal region of oil palm has been decayed by the pathogen. The foliar symptoms such as chlorosis of leaves on one side of palm, or 'one sided mottling' with newly opened fronds (leaves) being smaller and paler than normal can be clearly spotted on the infected palm (Singh, 1990). As the disease infection progresses, the fronds become totally pale and affected leaves eventually die with leaves drooping and fracturing at the base.

Generally, oil palm yield reduction due to BSR can be in two ways, low quantity and quality of fresh fruit bunch produced by infected palms and a total loss of standing palms due to the disease (Chong *et al.*, 2016). Moreover, the disease has been reported to cause significant economic losses with approximately US\$500 million per year (Hushiarian *et al.*, 2013).

Furthermore, BSR incidence prevalent in all oil palm areas in Malaysia, irrespective in coastal, peat or inland soils (Hashim and Tey Chin, 2008). High incidence of BSR was reported on oil palm in coastal areas in Peninsular Malaysia (Khairudin, 1990). The incidence of BSR in coastal areas can be as high as 85% of incidence by 25 years (Singh, 1990). However, the incidence of BSR in inland soil is much lower than