

## PRELIMINARY STUDIES ON THE POSSIBLE CAUSE OF DEATH OF CENTRAL SPEAR OF OIL PALM [*ELAEIS GUINEENSIS*] SEEDLINGS IN THE NURSERY

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### Summary

The sudden death of the central spear of oil palm seedlings in the pre-nursery stage was observed in a number of seedlings being raised for screening against *Fusarium oxysporum f. sp. elaeidis*, the causal agent of fusarium wilt in oil palm. The death of the central spear affected at the 2-3 leaf stage, initially starting with the youngest unopened central spear but later spreading to affect the other leaf (ves). Uprooting affected seedlings and careful washing of roots showed healthy root systems consisting of two long penetrating roots and a cluster of adventitious roots. In only one instance was one of the penetrating roots found dead. A longitudinal section along the root-shoot axis revealed a tunnel resulting from an insect damage presumed to be caused by *Temnoschoita quadripustulata*. An entrance into the tunnel was located on the side of the bulb facing the nut and was readily concealed by soil particles. The disease was found in seedlings with or without attached nuts. So far, records indicate that only two out of sixty seedlings (about 3%) exhibiting the same symptoms could not be associated with the insect damage. In these instances, a *Fusarium sp.* was isolated on incubation in a humid chamber or on a potato sucrose agar medium. The significance of the disease is discussed in this paper.

### Introduction

The oil palm is affected, to various degrees, by a number of similar diseases during its development stages. Following heat treatment to reduce seed dormancy, thermotolerant fungi, particularly species of *Aspergillus* and *Penicillium*, attack the radicles of germinating seeds (Turner and Bull, 1967; Turner, 1981). In the nursery, a number of diseases associated with fungi (Kovachich, 1954; Robertson, 1956; Johnson, 1959, mycoplasma (Renard and Franqueville, 1989) and alga (Weir, 1968) have been reported.

Diseases which occur in the field include *Fusarium* wilt (Wardlaw, 1946), *Armillaria* trunk rot (Wardlaw, 1950), *Ganoderma* trunk rot (Bull, 1954), *Phellinus* upper stem rot (Thompson, 1938) and *Erwinia* spear rot (Bull and Robertson, 1959). These diseases may be of local or general occurrence, a situation determined by agronomic and climatic conditions (Turner, 1976).

In raising seedlings for studies on the *Fusarium* wilt disease caused by *Fusarium*

*oxysporum f. sp. elaeidis*, sudden deaths of the central spear of pre-nursery seedlings were observed to occur infrequently at a nursery at the Oil Palm Research Institute (OPRI), Kusi. Symptoms appeared as sudden browning of the spear without yellowing, characteristic of wilting which is usually associated with root diseases. Lesions mostly originated from bases of affected spears inserted in the bulb, even though the frequency of occurrence was low. A nursery disease of similar symptoms was reported to be caused by *Phytophthora* species in Zaire (Kovachich, 1957) but Turner (1976) stated that *Fusarium sp.* might also be associated with it.

Studies into oil palm diseases at OPRI are currently aimed at finding the most important ones in the nursery and in the field that need to be controlled immediately. Consequently, an attempt was made to study the cause(s) of the sudden death of pre-nursery oil palm seedlings. The initial results are summarised in this paper.

### Experimental

Seedlings were raised in black polythene

bags (6cm x 10cm) filled with soil and mixture in the ratio of (2:1). Germinated seednuts of the commercial progeny G77 (OPRI, Kusi-Ghana) were sown at a seedling rate of one seed per bag. Bags containing the nuts were arranged linearly in groups of ten by one hundred, giving a total of one thousand bags per group. Each group was covered with palm fronds after spraying with Dithane (1.5g formulated product in 15 litres of water) to eliminate possible pathogens. The seedlings were watered once a day except during week-ends. After six weeks, the palm fronds which provided temporary shade, were removed. Weeds were frequently removed from the bags to allow for healthy development of the seedlings. The seedlings were examined weekly and any one showing the characteristic central spear death removed and investigated.

The investigation of the suspected central spear death started by washing away the column of soil after cutting through the polybag. Each seedling was carefully examined for any damage to the root system, the shoot and miniature bulb. Sixty-six (66) seedlings had been affected as at 31 December 1992 when all the seedlings had passed the pre-nursery stage.

**Results and Discussions**

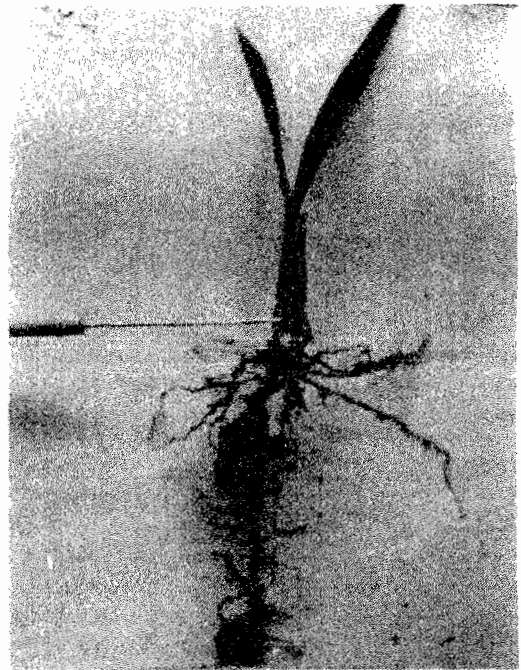
Symptoms appeared as darkening of the green colour of the central spear leaf which eventually turned brown (Fig.1) without any associated yellowing. The exact location of the greening was variable but most originated from the lower portion of the shoot inserted within the miniature bulb. Subsequently, it spread upwards towards the leaf tip. The entire leaf turned deep green before turning brown.

Roots were found to be healthy in all but one seedling in which the penetrating root was dead. The small bulbs of all affected seedlings were healthy. However, tunnels were found in the plumule immediately above the bulb in 58 out of 60 diseased seedlings (Fig.2). The entrance into the tunnels (Fig.3) were located adjacent to the attached nuts and were easily obscured by soil particles. No insects were found in the tunnels.

*Temnochloa quadripustulata*, a weevil has previously been implicated in a similar disorder.



**Fig. 1** Oil palm seedling showing central spear leaf



**Fig. 2** Miniature bulb of an infected seedling showing a tunnel in the bulb.



**Fig. 3** Miniature bulbs of two infected seedlings showing entrance (pores) into tunnel of the bulbs.

However, an unidentified Melolonthidae resembling *Schizoncha africana* was considered to be the likely causal agent (S.K Dery, personal communication). Incubation and isolations from the two seedlings not associated with any insect tunnel yielded a *Fusarium sp.* which has been tentatively identified as *Fusarium solani*. The pathogenicity of the fungus to oil palm seedlings is yet to be established.

Later cases of central spear death of pre-nursery seedlings raised during the rainy season are not associated with any insect damage but only with the *Fusarium sp.*

Although the frequency of the central spear death associated with insect damage is very low and may not be of any economic significance, problems associated with *Fusarium sp.* occur more frequently and if the *Fusarium sp.* isolated proves to be pathogenic to oil palm seedlings, then the disease could be potentially serious; since seedlings are tightly packed in the pre-nursery stage. Furthermore, watering, either by automatic sprinklers or by watering cans could

help disseminate inoculum from an infected seedling to healthy ones.

### Acknowledgement

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