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Oil Palm Root System Characteristics in a 12 Year Old Density Trial in Nigeria

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Abstract

Oil palm plantations have a typical economic life cycle of 25 years. As a monocotyleneous perennial crop the root system is radially distributed and shows no secondary growth but continuously expands. Oil palms are planted in an equilateral triangle design and the planting distance, determining the panting density, is fixed at the time of establishment. In time the roots from neighbouring palms will overlap and competition for soil resources can limit the growth and production of individual palms.

This paper presents the results from a root analysis study carried out on an oil palm density trial in Nigeria. The biomass and characteristics of the root system in an oil palm density trial have never been thoroughly studied so this would further the understanding of how planting distance affects underground processes in oil palm plantations for a particular environment.

The trial field was planted in 2005 following a Fisher block design with 6 treatments and 4 replicates. Plots consist of 72 palms of which the inner 20 are considered as useful (double row of border palms). The analysis was performed on 3 densities, D1, D3 and D6 corresponding to a planting distance of 9.5, 8.5 and 7.5 m and planting densities of 128, 160 and 205 $^{\text{palms}}/_{\text{hectare}}$ respectively. A simplified voronoi method was used for the root analysis on one palm per plot. The voronoi volume was divided in 4 or 5 zones and 4 horizons giving 16 or 20 sampling volumes. For each of these volumes all the roots were removed and sorted in primary, secondary, fine and dead roots. Biomass for each was determined and extrapolated to a palm and plot level. Scanned images of the roots were also taken and analysed with WinRhizo to determine the root length, surface and volume.

Keywords: *Elaeis guineensis*, oil palm, planting density, root architecture, root system

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