



Research Article

Biotic Stress as Induced by *Ralstonia solanacearum* on Groundnut Varieties (*Arachis hypogaea*, L)

Muhammad A** and Hayatu M*

Abstract

Ralstonia solanacearum is a destructive soil borne groundnut (*Arachis hypogaea*, L) pathogen. It causes reduction in groundnut production to at least 10%. In less affected field, 10%-30% groundnut plants show symptoms, causing more than 20% yield reduction. The experiment was arranged in Randomized Complete Block Design (RCBD) with three replications. The treatments include, seed inoculation, and stem injection, foliar spray and control. The result showed that there is significant differences ($P < 0.05$) for number of pod per plant at harvest between varieties, but there is no significant differences ($P > 0.05$) between treatment and treatment by interaction. There is significance difference ($P < 0.05$) between varieties for number of seed per plant at harvest, but there is no significant difference ($P > 0.05$) between treatment and treatment by variety interaction. The result for seed weight after harvest showed significant differences ($P < 0.05$) between variety and treatment by variety interaction, but there is no significant differences ($P > 0.05$) between treatment.

Keywords

Groundnut varieties; Growth; Phenology; Grain yield; *Ralstonia Solanacearum*

Introduction

Bacterial wilt caused by *Ralstonia solanacearum* has been described on a wide host range in many tropical and subtropical regions [1]. In the absence of susceptible crops, alternative weed hosts and non-host plants play important roles for the survival of *Ralstonia solanacearum*. *Ralstonia solanacearum* causes lethal wilting disease in more than 200 plants species [2,3], while over 450 species of plants were listed as host plants including many crops of economic importance. The process of *R. solanacearum* infecting plant had been well characterized in model crop briefly, it penetrate into cortical tissue of host roots, colonized and explode in numbers and cause a sudden deadly wilt of plant [4,5]. Infection in young plants results in rapid wilting of stems and foliage, while leaves retain their green colour [6]. Wilt symptoms can be observed 3 weeks after planting. Groundnut (*Arachis hypogaea* L.) is an economically valuable oilseed and cash crop grown in the savannah region of Nigeria. It is cultivated

for direct consumption as food and forage crops because of its high protein and oil contents. Its seed is used as a source of cooking oil and for industrial use [7,8]. The objective of this study was aimed at testing the effect of *R. solanacearum* on growth, phenology, and grain yield and disease incidence of groundnut varieties.

Materials and Methods

Experimental site

The experiment was conducted at the Department of Agronomy Research Farm, Faculty of Agriculture, Bayero University, Kano, latitude 11°58' N and longitude 8°30' E.

Seed collection

Eleven varieties of groundnut were used for this study. 7 improved varieties (SAMNUT 10, SAMNUT 18, SAMNUT 21, SAMNUT 22, SAMNUT 23, SAMNUT 24 and SAMNUT 25) were collected from Department of Agronomy Bayero University Kano and 4 local varieties (Bahaushiya, EX-Dakar, Mailbargo and Kwankwaso) were purchased from Dawanau grain market, Kano State.

Experimental design

The experiment was arranged in Randomized Complete Block Design with three replications and four treatments; leaf inoculation, seed inoculation, stems inoculation and control.

Methodology

The experiment involved infecting the leaves, stems and seeds of *A. hypogaea* with *R. solanacearum* to determine the effects on grain yield and and growth [9,10].

Isolation of *Ralstonia solanacearum*

Ralstonia solanacearum was isolated from soil sample collected from tomato fields. *R. solanacearum* was cultured on Tetrazolium chloride and purified on Nutrient agar at 30°C for 24 hrs [11].

Inoculum preparation and crop infestation

Bacterial growth on nutrient agar was washed on a slant in 5 ml distilled water and mixed well whereby a bacterial population of 1×10^8 cfu ml⁻¹ was obtained. 100 µl (0.1 ml) of *R. solanacearum* was used for stem inoculation. Also 6×10^8 cfu ml⁻¹ of *R. solanacearum* was used for seed and leaves inoculation [12].

Data collection

The following data were collected in both treated and non-treated groundnut varieties.

Growth rate: Collected samples were left to dry at room temperature for one week; and were taken for oven drying at 80°C for 24 hrs. Immediately, samples were weighed and recorded. Relative growth rate was calculated according to [13].

$$Rgr = (I_{nw} - I_{nw}) / (t_2 - t_1)$$

Phenology: Number of days to first open flower, days to 50% flower and days to 100% flower was taken for all the plants. This was computed in both the treatment and control [9].

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Journal Of Plant Physiology

Chao Zhang



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