

DEVELOPMENT OF NORTHERN LEAF BLIGHT FROM AN INOCULATED POINT SOURCE ON THREE MAIZE CULTIVARS IN UGANDA

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The progress and spread of *Exserohilum turcicum*, causal agent of northern leaf blight, was assessed for two years in Uganda 0.8-7.2 m from inoculated foci on one hybrid and two open-pollinated maize cultivars. The main effect of cultivar was significant for slope (h) and intercept of the linearised power disease gradient for number of lesions on the ear leaf (P=0.07). In the first year spread was limited to <3.2 m from inoculated foci on B73xMo 17 and KWCA-SR but disease spread up to 7.2 m on EV8428-SR. In the second year disease did not spread >1.5 m on Oh69xB73 but spread up to 7.2 m on KWCA-SR. At 2.4 m from inoculated foci, the apparent infection rate (j) ranged from 0.03 to 0.11 lesions/day. Results indicate that maize genotype affects both progress and spread of *E. turcicum* but seasonal variations may affect the magnitude of disease gradients.

Key words: Disease gradient, *Exserohilum turcicum*, Uganda, *Zea mays*

EFFECT OF CARBOFURAN, ENDOSULFAN AND HOST RESISTANCE ON COWPEA FIELD PEST INFESTATION IN UGANDA

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Seed dressing trials were conducted on-farm for three consecutive seasons in eastern Uganda. Seed dressing with carbofuran (applied as a soil drench) significantly reduced aphid and nematode infestations but not thrips, pod borer and pod bugs infestations. Pest infestations were not significantly influenced by endosulfan seed dressing. Although no significant difference in grain yields was observed between the two seed treatments, higher grain yields were obtained from plots that received carbofuran seed dressing than the untreated control or endosulfan treated plots. The introduced cultivars (SVU- 116 and 1T82D-7 16) had significantly higher number of pod bugs than the local cultivars (Ebelat and Icirikukwai) but Ebelat and 1T82D-7 16 had significantly higher pod borer infestation than SVU- 116 and Icirikukwai. Aphids, thrips and nematodes densities were similar across all varieties.

Key words: *Aphis craccivora*, carbofuran, endosulfan, nematodes, *Vigna unguiculata*

PATHOGENICITY OF INDIGENOUS ISOLATES OF *Beauveria bassiana* AND *Metarhizium anisopliae* TO THE BANANA WEEVIL, *Cosmopolites sordidus* (Germar)

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Laboratory experiments were conducted to test the pathogenicity of indigenous fungal pathogens to the banana weevil, *Cosmopolites sordidus* Germar in Uganda. Six isolates of *Beauveria bassiana* (Bals.) (KB/90/1, KB/91/3, KBI91/4, KB/91/5, KB/91/6, KB/91/7) and two of *Metarhizium anisopliae* (Metschn.) (KMJ90/2, KM/9218) were tested on adult weevils to assess influence of spore dose and temperature on their pathogenicity. All isolates were pathogenic to *C. sordidus* except KM/90/2. Mortality started within 5-10 days, and 50 - 100% mortalities were attained within 2 to 3 weeks post-inoculation, depending on the virulence of the isolate. Infectivity of the isolates increased with increasing spore concentration. At high spore doses, mortalities caused to adult male and female weevils by KB/91/3, KB/91/4 and KBI91/5 did not vary significantly, but varied significantly ($P < 0.05$) at low spore doses. The range of mortalities recorded for the highest spore dose (3.35×10^8 spores weevil) were 91.7- 98.6% and 91.4-94.3%, for female and male weevils, respectively, while that recorded for the lowest dose (3.35×10^6 spores weevil) were 8.6 - 28.6% and 7.1 - 11.4%, respectively. When isolates KB/91/3 and KB/91/5 were tested at 19°C and at 32°C, the infectivity of each isolate did not vary significantly with temperature but, at 19°C and 32°C, infectivity of KB/91/3 was significantly higher than that of KB/91/5.

Key words: Biocontrol, fungal pathogens, banana weevil, dose mortality

**EVALUATION OF CASSAVA FOR REACTION TO ROOT-KNOT
NEMATODES (*Meloidogyne* spp.) IN UGANDA**

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There are several reports of the variability of cassava (*Manihot esculenta* Crantz) variety response to *Meloidogyne* spp. infection. However, the minimum population of *Meloidogyne* spp. that will cause a significant measurable loss in cassava production is not known. This study evaluated the reaction of 13 cassava varieties to root-knot nematodes and estimated the threshold of root-knot nematode damage on cassava in pot trials, using 0, 100, 1000, 10000 and 100,000 *Meloidogyne* spp. eggs per plant as inoculum. Root-knot nematodes significantly ($P < 0.05$) reduced plant height and fresh root weight, four months after inoculation. The lowest initial *Meloidogyne* spp. population that caused a significant reduction in plant height and fresh root weight was 1,000 eggs per plant. This is a damage threshold in pots where the rhizosphere may be limiting. It is, therefore, necessary to establish how their loss translates into production loss *in situ* field situations and the nematode population that can cause this loss. There was variability in the reaction of the different cassava varieties to root-knot nematode infection, signifying that identifying and using resistant/tolerant cassava varieties may give a viable alternative of controlling root-knot nematodes on this crop.

Key words: Damage threshold, host reaction, *Manihot esculenta*, *Meloidogyne* spp., Uganda.

**SCREENING SOLANUM POTATO GENOTYPES FOR RESISTANCE TO
Pseudomonas solanacearum IN UGANDA**

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Bacterial wilt (*Pseudomonas solanacearum* E. F. Smith) is the most destructive potato (*Solanum tuberosum* L.) disease in the warm lowland and mid-altitude tropical environments. Although resistance to the bacterium is unstable, it can be used in combination with other control measures to achieve acceptable levels of control. Twenty six potato genotypes were grown in Uganda for three consecutive seasons in three diverse sites heavily infested with the bacterium. To ensure high and uniform level of inoculum, susceptible tomato plants were grown each season prior to planting the test genotypes, and at the end of the growing seasons, infested plants were chopped and spread to cover the experimental plots. All test plants became infected, but the onset of disease and wilt severity varied significantly ($P=0.001$) among the test cultivars, and were markedly higher in the warm lowlands (1200 m a. s. l.) than in the highland (2200 m a. s. l.). Over the three seasons of study, five genotypes namely, Rosita, Cruza, 720144, 388575.5 and 390016.1 maintained high level of resistance, and genotypes 388575.5 and 382575.5 consistently yielded highly, even in the lowland areas of Uganda. These resistant genotypes could form part of an integrated disease management package against *P. solanacearum*.

Key words: Bacterial wilt, integrated disease management, *Solanum tuberosum*

**OCCURRENCE OF *Pseudomonas solanacearum* LATENT INFECTION IN
POTATO TUBERS AND WEEDS IN HIGHLAND UGANDA**

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Occurrence of *Pseudomonas solanacearum* E. F. Smith latent infection in highland potato seed tubers and weeds were tested using the incubation and Kelman's media techniques. Potato seed tubers were found latently infected using both techniques. Storing and incubation of potatoes increased the detection of latent infection as a bacterial ooze, but did not improve detection using Kelman's media. Herbaceous weeds from both potato fields and fallow plots were also latently infected. The weeds included *Ageratum conyzoides*, *Amaranthus* sp., *Bidens pilosa*, *Erigeron floribundus*, *Galinsonga perviflora*, *Leucas martinicensis*, *Oxalis latifolia*, *Polygonum napalense*, *Rumex abyssinicum*, *Spergula arvensis*, *Stellaria sennii* and *Tagetes minuta*. No bacterial colonies were isolated from grass weeds. Therefore, herbaceous weeds probably play a significant role in the survival of *P. solanacearum*. Grass weeds, pastures or grass crops such as wheat, could be included in rotation management of this disease in Uganda.

Key words: Bacterial wilt, Kelman's media, ooze, *Solanum tuberosum*

REACTION OF ASPARAGUS GENOTYPES TO RUST IN UGANDA

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Fourteen asparagus (*Asparagus officinalis* L.) genotypes were evaluated for resistance to rust (*Puccinia asparagi* D.C.) in a high rust pressure zone in Uganda. Genotypes Appollo and Atlas were wiped out but UC157F1, Jersey Giant, Grande and Cito showed good resistance. A second trial compared a susceptible check (Franklin) and three cultivars (Jersey Giant, Jersey Hybrid and UCI 57F₁) identified as resistant to rust in the United States, in lowland (Kawanda, 1777 metres above sea level, masl) and highland (Kalengyere, 2500 masl) areas. Rust pressure was significantly higher in the lowland, and caused significant yield reduction, unlike in the highlands where it was low and no significant genotypic differences were detected. In the lowlands, the yield of the susceptible check was comparable to those of the “resistant” genotypes when sprayed with Mancozeb 85% WP.

Key words: *Asparagus officinalis*, *Puccinia asparagi* host resistance, Mancozeb

BEANFLY DAMAGE AND ITS RELATIONSHIP TO BEAN YIELD AND YIELD COMPONENTS

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This study was conducted to determine the relationship between beanfly damage and bean (*Phaseolus vulgaris*) yield. Beanfly population densities were manipulated by applying endosulfan (a.i. 35 W/V), e as seed dressing treatment prior to planting and/or as sprays at frequencies of one, two and three time week in seed-dressed and non-dressed bean plots In all the seasons, endosulfan treatments reduced be densities from more than 15 pupae per ten plants in untreated plots to less than 2 pupae per 10 plants in dressed plots. Increasing the number of sprays per week resulted in significant reduction in be infestation and bean yield per hectare. Correlation analysis indicated significant negative relation between beanfly population density and seed dressing only with endosulfan was a sufficient control me: against beanfly.

Key words: *Ophiornyia*, Beans, *Phaseolus vulgaris*, yield loss

EFFECT OF HOST GENOTYPE, TIME OF PLANTING AND SPACING ON EPIDEMICS OF GROUNDNUT ROSETTE AND CERCOSPORA LEAF SPOT DISEASES IN EASTERN UGANDA

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Groundnut rosette (a viral disease transmitted by aphids) and Cercospora leaf spots (fungal disease caused by *Cercospora arachidicola* Hon and *Cercosporidium personatum* Berk & Kert) are the major groundnut diseases throughout Uganda. The effectiveness of different cultural practices (i.e., planting density, planting time and host resistance) for the management of these diseases was evaluated at 4 farmer sites for 2 seasons of 1999. Close spacing (330,000 plants/ha) resulted in high Cercospora area under disease progress curve (AUDPC) and low rosette incidence, however, wide spacing (60,000 plants /h) resulted in high rosette incidence and low Cercospora AUDPC. *Igola-1* was most resistant to both diseases compared to the 2 local cultivars *Erudurudu* and *Etesot*. Early-planted crops (onset of rains) showed a high disease build-up but higher yields compared to intermediately-planted crops (3 weeks after the onset of rains). Late-planted crops (5 weeks after onset of rains) had high disease and the lowest yields. Yield was greatly increased by early planting (onset of rains), close planting/ high plant density and host resistance (cultivar *Igola-1*).

Key words: Groundnut rosette virus, Cercospora leaf spots, Integrated Disease Management, Uganda

**FIELD RESISTANCE OF ICRISAT GROUNDNUT GENOTYPES TO
GROUNDNUT ROSETTE AND CERCOSPORA LEAF SPOT DISEASES IN
EASTERN AND CENTRAL UGANDA**

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Groundnut rosette, early and late leaf spots are the most important diseases of groundnut in Uganda. Sources of resistance to these diseases have been identified in some ecologies, however, information on the performance of these diseases under Ugandan condition is lacking. The objective of this study was to identify sources of resistance to groundnut rosette and *Cercospora* leaf spots from elite lines obtained from ICRISAT, Malawi under two different ecologies in Uganda. Fifty seven genotypes along with 3 local groundnut genotypes were evaluated for resistance to the diseases and yield attributes for two years. Differences among genotypes, locations and seasons was significant for groundnut rosette and yield whereas for *Cercospora* leaf spot, variation was only significant for season x genotype and among genotypes. The location x season x genotype interactions were significant for rosette and yield but not for *Cercospora* leaf spots. Overall 12 lines were resistant to rosette while 12 were also resistant to *Cercospora* leaf spot and ICG V-SM 94706, ICGV-SM 91707 and *Igola-1* were resistant to both diseases.

Key words: *Cercosporidium personatum*, *Cercospora arachidicola*, *Arachis hypogea*, rosette virus, Uganda

EFFICACY AND ECONOMIC BENEFIT OF DIFFERENT CHEMICAL SPRAY REGIMES ON THE MANAGEMENT OF THE MAJOR PESTS AND DISEASES OF GROUNDNUT IN EASTERN UGANDA

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The efficacy and economic benefit of different insecticide and fungicide spray regimes and their combination for the control of major groundnut pests, groundnut rosette and *Cercospora* leaf spot diseases were evaluated on one susceptible groundnut cultivar *Etesot* in the first and second seasons of 1999. The trials were established at two sites (i.e., on-station and on-farm) in Kumi district, eastern Uganda. The insecticide Dimethoate, fungicide Dithane M45 and cocktail mixtures of Dimethoate and Dithane M45 were applied at different frequencies (spray regimes). Insect and disease incidence and severity were recorded. Weekly application (7 sprays) of either insecticide or fungicide or a combination resulted into the lowest rosette incidence and *Cercospora* AUDPC, respectively. These treatments in turn gave the highest yields, but the marginal rate returns (MRR) were not profitable. Two or three dimethoate sprays were economically effective in controlling groundnut rosette, aphids and thrips with MRR= 2.07 and 1.51, respectively. Sole fungicide spray regimes were not profitable and pod yields from these plots were less or equivalent to those obtained from the control. A combination of insecticide and fungicide greatly increased groundnut yield and gave high MRR, with treatments of 1 Dimethoate + 1 Dithane M45 and 2 Dimethoate + 2 Dithane M45 sprays giving MRR of 2.11 and 1.30, respectively.

Key words: Groundnut rosette, *Cercospora* leaf spots, chemical control, marginal rate of return

**INFLUENCE OF TIME OF PLANTING AND SPACING ON DEVELOPMENT
OF LEAF BLAST ON UPLAND RICE**

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An on-station experiment was conducted for two seasons at Kabanyolo, Uganda, to investigate the influence of date of planting and spacing on the development of leaf blast on upland rice. Inter-row spacing had significant ($P < 0.05$) effect on incidence of leaf blast. The highest incidences were recorded from 20- and 30- cm spacings in comparison to 40- and 50cm spacings. Mean blast infection 0, 10, and 20 days after planting (DAP) were 16.3, 19.4, and 35.6%. Interactive effects of spacing and time of planting significantly ($P < 0.05$) influenced the incidence of blast and blast lesion length in the two trials, and number of lesions and cumulative disease development during the second trial. High plant populations (close spacing), late planting (≥ 20 days after on-set of the rains) increased the incidence and severity of blast.

Key words: Disease development, date of planting, *Pynularia grisea*

THE RESISTANCE OF IMPROVED CASSAVA VARIETIES TO CASSAVA MOSAIC DISEASE IN UGANDA

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Breeding and selection for resistance to cassava mosaic virus disease (CMD) has been a major concern for the control of the disease in Africa. Six improved varieties; *Nase 1*, *SS2*, *.5S4*, *SS5*, *SSÔ* and, *SS8* developed at Namulonge Agricultural and Animal Production Research Institute and *Ebwanateraka* (local cv) were evaluated for resistance to CMI) in different agro-ecological zones of Uganda. Incidence of CMI), and progress amongst the varieties were monitored at four locations. Adult whitefly populations were also recorded. CMD infection pressure varied significantly ($P=0.001$) amongst the locations. irrespective of variety, high, intermediate and low CMD incidence levels were recorded at Nakasongola, Ngeta/Isimba and Namulonge, respectively. However, incidence of CMD on the improved varieties were stable across locations and significantly lower than on *Ebwanetereka*. The areas under the disease progress curves (AUDPCs) and apparent infection rates (r) followed a similar trend. Significant variety x location interactions were observed for disease incidence, AUDPC and infection rates. Whitefly populations varied with crop age with peaks 3 months after planting. The need for different CMD control strategies targeting different infection pressure zones was apparent from the results.

Key words: Agro-ecologies, control strategy, genotypes, infection pressure, Uganda, whiteflies, cassava

EFFECT OF WEED MANAGEMENT PRACTICES ON GROWTH AND YIELD OF COWPEAS

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An investigation was carried out to determine the effect of weed management regimes on growth and yield of cowpeas (*Vigna unguiculata* L. Walp). The common weeds were controlled using a hand hoe and glyphosate applied once at 30 days after planting (DAP), twice at 15 and 30 DAP, and throughout cowpea growth. Cowpea leaf area index (LAI) and dry matter accumulation per plant were significantly reduced when the crop was left unweeded for more than two weeks after planting. The intensity of weeding influenced weed biomass :at crop harvest, being higher in plots which were less frequently weeded. Maintaining weed-free conditions throughout by both methods of weed control and weeding twice at 15 and 30 DAP resulted in better yield compared to other treatments. The highest crop yield was obtained when weed-free conditions were maintained throughout (1751 kg ha⁻¹) and the lowest in plots where weeding was done only once with a herbicide (214 kg ha⁻¹). No yield was recorded in the unweeded plots as the cowpea was completely smothered by the weeds. However, frequent weeding of cowpea was uneconomical. Weeding once with a hoe or twice at 15 and 30 days after planting or maintaining weed-free conditions using a herbicide gave the best economic returns.

Key words: Economic returns, glyphosate, hand-hoe, *Vigna unguicuiata*, weed competition