

# Mango bacterial black spot disease is one of the most devastating diseases of mangoes worldwide

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## Abstract

Mango bacterial black spot disease is one of the most devastating diseases of mangoes worldwide. The disease was observed in some mango orchards in the Lower Manya and Asuogyaman districts of the Eastern region and North Tongu district of the Volta region of Ghana. The objectives of this study were to determine assess farmer's perception and knowledge on prevalence, spread and economic importance of the mango bacterial black spot disease, determine the disease incidence and severity in mango farms, assess the effect of the disease on yield/fruit quality, confirm the causal agent of the current outbreak of the disease in the study area as *Xanthomonas campestris* pv. *mangiferaeindicae* using morphological characteristics, biochemical, physiological and Cpn60 gene and evaluate some selected fungicide/bacteriocides for control of the disease in the field. Questionnaires (60) were administered to farmers who were actively engaged in mango farming in the study areas. These were read out and interpreted to farmers when necessary for clarity. The questionnaires covered general background of the farmers and their perception and knowledge concerning cause, importance, spread and control of the disease. Data collected were analyzed using descriptive statistical analysis (means and percentages). Diseased fruits and leaves were collected for isolation and identification of the causal organism during the survey study. The disease incidence and severity were determined using the disease rating scale of 0-5 in the study areas where ten mango farms were randomly selected from each district for the assessment. Field trial was carried out at a commercial mango orchard in the in the Lower Manya Krobo District to evaluate fungicides against the causal organism of bacterial black spot of mango. Identification of the causal organism was carried out using morphological characteristics, biochemical, PCR and gene sequencing was done in Biotechnology laboratory, University of Ghana and Inqaba Biotech West Africa Limited at South Africa. Determination of the effect of mango bacterial black spot disease on the yield/fruit quality of mango was on different mango cultivars, namely Keitt, Haden and Palmer at the Soil and Irrigation Research Centre at Kpong. Detached mango leaves of kent variety were inoculated with bacterial suspension of  $1.0 \times 10^6$  CFU/mL using the needle prick

method. In vitro evaluation of the inhibitory effect of some copper base fungicides on the growth of *Xanthomonas campestris mangiferaeindicae* was carried out in the plant pathology laboratory using fungicides such as Funguran (5 g/l), Curenox (4g/L), Funguran+Mancozeb (5 g: 4 g/l), Curenox+Mancozeb (4 g: 5 g/l), Cuprofix (6.7 g/l), Caldo (6.7 g/l) and sterile distilled water (negative Control). Disc fusion method was used, treatments were replicated three times and arranged in randomized complete design. Data collected were subjected to analysis of variance (ANOVA) using GENSTAT 12th edition and means separated using LSD ( $P < 0.05$ ). Farmers in the study areas demonstrated good knowledge of the disease. The disease incidence ranged from 27% in Asuogyaman District, 69.2% in Lower Manya Krobo and 90% in the North Tongu District, while severities were 0.5 to 3.0 on a scale of 0-5 respectively. The disease caused a fruit quality/yield loss of 71.5% and the pathogen was confirmed as *Xanthomonas campestris* pv. *mangiferaeindicae* based on cultural, morphological and sequence analysis of the cpn60 gene. In this study, all isolates grouped with those downloaded from Figshare and Genbank. The pathogen was able to cause disease on mango leaves and metallic copper+Mancozeb (Cuprofix-30 disperse) demonstrated antibiotic effect on the bacterium and drastically reduced the fruit quality/yield loss due to the disease. In the in-vitro study, Funguran 5 g/L (50% Copper hydroxide) completely inhibited the growth of *Xanthomonas campestris* pv. *mangiferaeindicae*.

## Biography:

Osabutey Samuel is Experienced Research and Graduate Assistant with a demonstrated history of working in the higher education industry. Skilled in Report Writing, Writing, Microsoft Office, Statistics, and Research. Strong education professional with a Master of Philosophy - M. PHIL focused on Plant Pathology/Phytopathology (Nematology, mycology, bacteriology, virology) from the University of Ghana. I have conducted several cutting-edge researches on bio-efficacy (botanical and synthetic fungicides and nematicides) studies on nematodes, bacterial and fungal diseases both in-vitro and field trials. Identification and control plant diseases

on vegetable crops, tree crops, water and soil analysis. Recommend best integrated disease management strategies to farmers across the country. Masters of Philosophy in Crop Science (Plant Pathology) My MPhil thesis focus on the Characterization and control of *Xanthomonas campestris* pv. *mangiferaeindicae* causing mango (*Mangifera indica*) bacterial black spot disease in some selected Districts of Eastern and Volta region of Ghana.