SIGNIFICANCE OF HOST pH CHANGE DURING *COLLETOTRICHUM MUSAE* INFECTION OF BANANA

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The host environment pH is a regulatory factor in pathogenesis of certain fungi. Some fungi increase the host pH while others tend to reduce it. Certain *Colletotrichum* spp. have the ability to modulate host pH by secreting ammonia locally into the host tissue, resulting in a pH increase which enables enzymatic secretion and enhanced virulence.

Colletotrichum musae causes quiescent infections in immature banana fruits which develop into anthracnose lesions during ripening. The objective of this study was to determine the pH changes caused by C. *musae* during anthracnose development, mechanism involved and whether the pH change affects disease development.

Healthy unripe fruits of eight local banana cultivars were inoculated with *C. musae* while the controls were treated with sterile distilled water. The fruits were incubated in moisture chambers at 28 ± 2^0C and allowed to ripen naturally. pH measurements were taken daily from day 3 to day 8 using a flat ended pH probe. pH of the healthy peel was measured in control fruits, and anthracnose lesion diameter and pH of the diseased peel were recorded. The results were analyzed using ANOVA. To determine if *C. musae* produces ammonia, the fungus was grown in a medium with potato extract suspended in sucrose-free Czapek Dox nutrient solution having different pH values (3-9). After 5 days of incubation under continuous shaking the final pH of the medium was recorded and the ammonia concentration of the medium was measured using an ammonia electrode.

During natural ripening the peel pH of the more susceptible cultivars "*Ambon*", "*Anamalu*", "*Embul*", "*Kolikuttu*" and "*Seeni*" increased up to the range of 5.6-5.9 whereas the peel pH of less susceptible cultivars "*Rathambala*", "*Puwalu*" and "*Alukesel*" remained below 5.6. Inoculation with *C. musae* increased the peel pH of all cultivars compared to uninoculated fruits. The increase in pH during disease development was less in cultivars which were less susceptible to the disease (below pH 6) than the more susceptible cultivars (above pH 6). These results suggest that the degree to which *C. musae* increases the pH is probably dependent on the degree of susceptibility of the cultivar.

C. musae in vitro produced ammonia at all pH levels, to varying degrees (6.1 mg/L to 48.1 mg/L). Correspondingly a pH increase was also observed in the medium (0.1 to 2.4 points). Both the percentage ammonia production and the percentage increase in pH were highest when the initial pH of the medium was at 4.0.

Results suggest that high pH levels enhanced the ability of *C. musae* to cause disease, which may be achieved by the production of ammonia as revealed by *in vitro* investigations. Therefore anthracnose development was less in cultivars which remained at low pH levels during natural ripening. Lower peel pH prevailing in these cultivars appears to be a host defence strategy where a greater effort is needed from the part of the pathogen to develop anthracnose. It can be concluded that in addition to induced defences (PR proteins, antifungal compounds) host pH too, contributes to confer banana fruit resistance to anthracnose.

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