ABSTRACT

Evaluation of Chlorophyll Meter Technology as a Diagnostic Tool in the Fertilizer Management of Corn (*Zea mays* L.) and Patchoi *(Brassica rapa* subsp*. chinensis*)

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Over- as well as under-fertilization, especially with nitrogen (N), can result in economic loss for the farmer, as well as edaphic and environmental consequences. The chlorophyll meter (CM) has been reported as a promising new diagnostic tool that allows farmers to make in-season N application decisions. Thus, the main objective of this thesis was to evaluate the applicability of the N-Tester CM as a 'quick' N management tool for corn (*Zea mays* L.) and patchoi (*Brassica rapa* subsp*. chinensis*) production. Experimental trials were conducted over a two year period on River Estate Soil Series; a fine-loamy, micaceous, isohyperthermic (*Fluventic Eutropepts*). These trials consisted of both single and split fertilizer field experiments on corn and a greenhouse experiment on patchoi, utilizing a range of N rates and a zero-N control. The results are presented in manuscript format comprising four papers. Three of these papers documented a detailed analysis of the significant relationship ($P < 0.05$) found between N-Tester values (NTV) and leaf N concentration (LNC), as well as fresh marketable yield (FMY) and the range of fertilizer N-rate (FNR) treatments. This information was used to determine the NTV model, based on time (weeks after planting), with the best ability to predict FMY; in addition to calculating critical N. The fourth paper sought to summarize the scientific information gained from the experimental trials and correlated it to basic financial return benefits for farmers, mainly by comparing the maximum economic rate of N (MERN) to the optimum N rate (ONR). Based on findings, the N-tester has the potential to act as a substitute for destructive laboratory plant tissue testing. Preliminary economic evaluation suggests that the meter's cost may be prohibitive for very small farmers. However, its ability to provide immediate site-specific scientific N fertility evaluation can probably surmount to savings on fertilization costs and profits from yield optimization.

Keywords: fertilizer management; chlorophyll meter; *Zea mays* L.; *Brassica rapa* subsp*. chinensis*, maximum economic rate of N.