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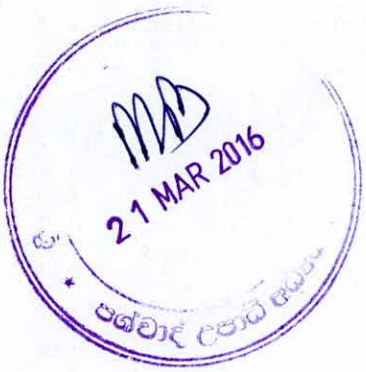
Postharvest quality and sensitivity to anthracnose disease of *Carica papaya* L. 'Red Lady' affected by Papaya ring spot virus



by

Peella Kankanamage Chamika Buddhinie

Thesis submitted to the University of Sri Jayewardenepura for the Degree of Master of Philosophy in Botany

I / we certify that by the candidate has incorporated all corrections, additions and amendments recommended by the examiners.

.....

Prof (Mrs). N. Salim

(Principal Supervisor)

Date: 14th March 2016

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Dr. K. H. Sarananda

(External Supervisor)

Date: 18/3/2016

DECLARATION

The work described in this thesis was carried out by me under the supervision of Prof (Mrs). N. Salim and Dr. K.H. Sarananda and a report on this has not been submitted in whole or in part to any University or any other Degree/Diploma.

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P. K. C. Buddhinie

Date: 14th March 2016

We certify that the above statement made by the candidate is true and that this thesis is suitable for submission to the University for the purpose of evaluation.

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Prof (~~Mrs~~). N. Salim

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Date: 14th March 2016

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Dr. K. H. Sarananda

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Date: 18/3/2016

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This thesis is dedicated to my lovely, little daughter;

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Postharvest quality and sensitivity to anthracnose disease of *Carica papaya* L. 'Red Lady' affected by Papaya ring spot virus

P. K. C. Buddhinie

ABSTRACT

Papaya (*Carica papaya* L.) Red Lady variety has been identified as a *papaya ring spot virus* (PRSV) - tolerant variety. However, Red Lady papaya fruits with abundant ring spot symptoms on skins are commonly seen in local market since last few years.

Therefore, an investigation was carried out to determine any effects of this virus on post harvest and nutritional parameters of papaya Red Lady fruits. A sensory evaluation also was carried out to determine the effect of PRSV on organoleptic properties of fruits. The investigation was further extended to find out the effect of PRSV on anthracnose disease development of papaya fruits.

Since the initial screening carried out at commercial 'Red Lady' plantations showed plants with no external virus symptoms also carry PRSV, they were categorized into severe and mild disease levels based on the results of double antibody sandwich enzyme linked immuno-sorbant assay (DAS-ELISA) test. Market samples of this variety were selected depending on the abundance of visual PRSV symptoms on fruit skin.

Of all the post harvest parameters considered, severe infections significantly decreased the contents of Total soluble solids (TSS) and brightness of the flesh colour (L* of L*a*b* colour space) while other parameters such as titratable acidity (TA), pH, flesh firmness, and a*, b* and hue attributes of flesh colour had negligible effect. However, harvesting at different maturity stages had significant effect on TA, pH and all the flesh colour attributes

(L*, a* and hue) except b*. Significant interaction between disease severity and harvesting maturity was resulted only for L* and b* attributes of flesh colour.

Severe infections in field samples had significantly decreased nutritional parameters such as total amino acids, methionine and tryptophan amino acids and sodium (Na) content. Although percentage ash content, β carotene, minerals (K, Mg, Ca, Fe and Zn), ascorbic acid, crude protein contents, were affected by the infection, the effects were not significant. No significant change in quantities was observed on moisture percentage, crude fat, and the lycopene content between the two disease levels. Market samples with PRSV symptoms recorded significant reduction in lycopene, β carotene and Ca content and a significant increase in amino acid tryptophan with compared to those of fruits with no symptoms. Other nutritional parameters assessed did not exhibit any considerable changes in quantity between the two set of market samples.

Sensory evaluation carried out to determine the effect of PRSV on organoleptic properties such as odour, flavour and overall acceptability revealed that there was no significant effect of the virus infection on organoleptic properties considered. Similar to the field samples, there was no significant effect of virus on the organoleptic properties of market samples due to the virus symptoms.

Non inoculated and inoculated anthracnose lesion development also revealed there was no marked effect on disease development between two disease severity levels as well as between market fruits with and without PRSV symptoms.

In general, PRSV infections negatively affected some of the post harvest parameters and nutritional considerations, while it neither had considerable effect on consumer preference and nor an impact on anthracnose disease development in fruits.