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RESEARCH NOTE

Evaluating the post infectional management of papaya to ring spot infection as influenced by micro-nutrient sprays

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ABSTRACT: Papaya Ring Spot Virus is a major viral pathogen of papaya and severely affects the growth and yield. The infection may lead to a total loss of the crop. Post infection nutrient sprays were given at fortnightly intervals. There was a highly significant increase both in fruit number and yield. The notched box plots and the bean plots were drawn in R, such plots help to evaluate the effects of inventions. The code to created plots is also included.

Keywords: Micro nutrient, papaya, ring spot virus

Papaya (*Carica papaya*) is cultivated in India in a large scale and has high commercial importance due to its fresh fruits which are mainly consumed raw. Papaya fruits have a high nutritive and medicinal value. India produces an annual output of about 3 million tonnes which is the largest in world. Papaya Ring Spot Virus is a major viral pathogen causing severe economic losses to the crop. Papaya Ring Spot Virus is a major viral pathogen causing severe losses to the crop (Jain *et al.*, 2004; Tripathi *et al.*, 2008). The infection appears on the well growing crop at about 8th month after planting and in some cases leading to a total loss of yield from the second year onwards. The support given by the National Horticultural mission has successfully produced large tracts where papayas are cultivated, Regretfully the incidence of PRSV is also seem to have increased. Control or management of PRSV on existing crop is required. With a view to extend the productive phase of papaya plants and obtain a marketable yield on the second year, a series of experiments on the use of micro - nutrient sprays post infection ally was conducted at the Indian institute of Horticultural Research, Bengaluru, India. Seedlings of Papaya variety 'Red Lady' were grown in a protected nursery and were transplanted to the main field. All horticultural cropping practices were followed. Once the PRSV infection symptoms were noticed, combined sprays of Soluble Boron (1g/L), Zinc Sulphate (2g / L) + Micro nutrient Spray (1ml/L) were given at fortnightly intervals (at 0.5 L per plant. Unsprayed plants served as control. The fruit number and total yield for two years was collected and the data were analyzed using Welch Two Sample t-test (Weiss and Weiss, 2012) using the software R. The results indicated that there was a highly significant increase both in fruit number (14.02 fruits) and in fruit yield (15.94) in response to the micro nutrient sprays (Fig. 1) in the second year. The notched box plots also indicated that there was highly significant differences among the means of the sprayed plants response in the second year as the notches did not coincide. The bean plots indicating the data distribution and drawn in pairs also indicated that the distribution of sprayed plants for their fruit number and yield were not highly skewed and were platykurtic (Fig. 2). There is a general tendency to use pesticides for the management of plant viral diseases, but such an approach is not successful due to the fact that transmission, and vector colonization is asynchronous in Papaya. Hence, integrated management practices for post inflectional management need to be assessed. Papaya ring spot virus has been managed in an integrated manner (Flores Revilla *et al.*, 1993; Pérez *et al.*, 1993; Kiritani and Su, 1999; Sharma *et al.*, 2008). The usefulness of the of the management practices in disease progress has been also evaluated (Jeger, 2004). Robust statistical tests required to quantify the effect of interventions by and their graphics have been described (Pérez *et al.*, 1993, Garrett *et al.*, 2004 Hothorn and Everitt, 2009) The use of such graphs help to evaluate the effects of interventions, As there are no viricides available such methods will help to quantify the usefulness of interventions helping to evolve better methods of management, where the aim is to prevent complete loss of the crop and obtain at least a minimum yield after

infection. The commonly practiced methods of spray of pesticides to manage viruses needs to be modified to one of management of the loss caused. The farmers are in dire need of similar post–inflectional management strategies which will help to manage and salvage the crop from total loss. Such type of management strategies, their analysis and graphing methodologies will help the farmers reduce their looses.

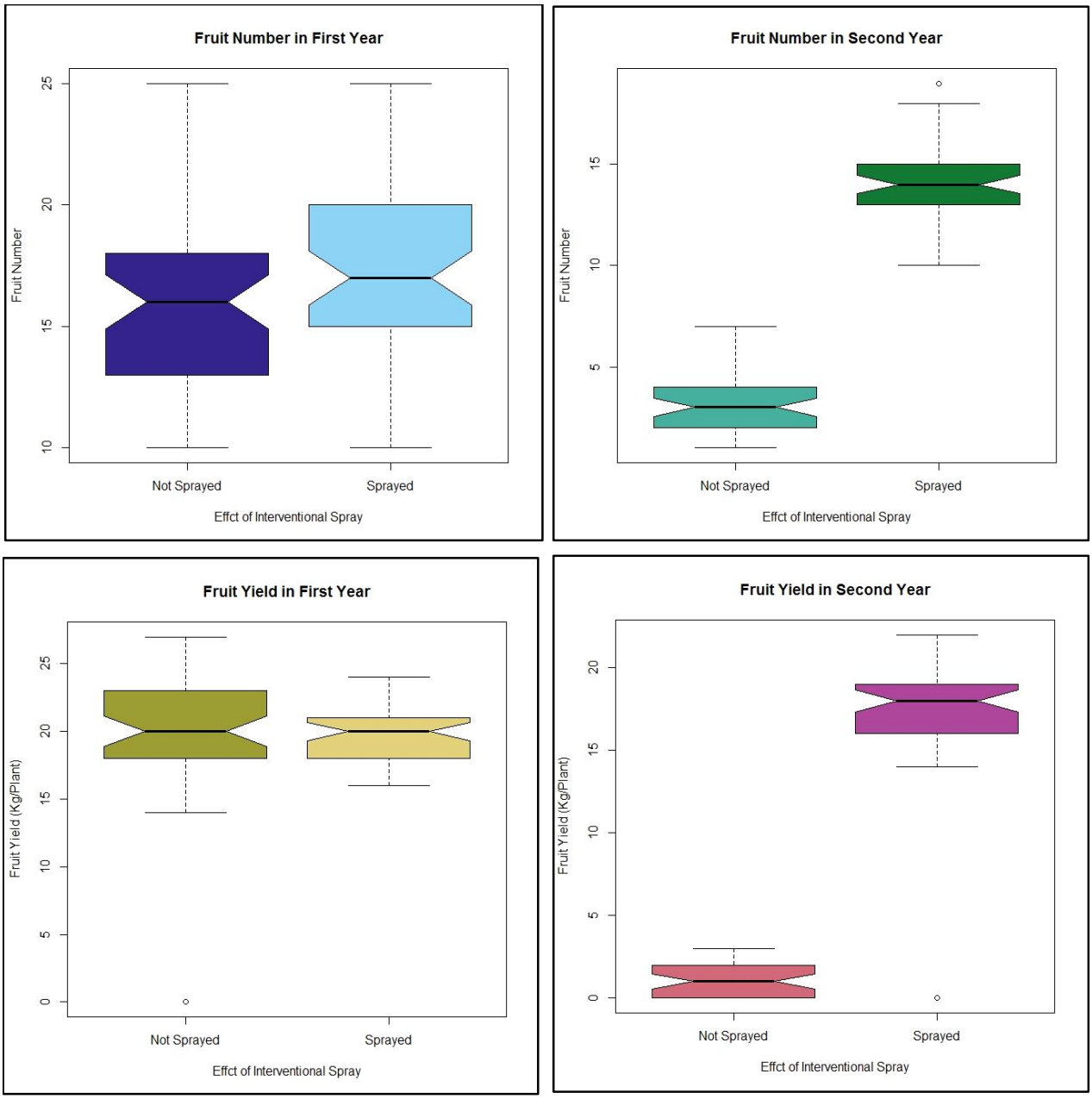

Fig. 1. Notched Box Plots of Fruit Number and Fruit Yield in first and second years showing overlap of means.

Welch Two Sample t-test for analysis of the t-statistic
t = -1.5794, df = 95.361, p-value = 0.1176, mean 16.28, 17.36
t = -29.7611, df = 87.953, p-value < 2.2e-16, mean 3.16, 14.02**
t = -0.1046, df = 61.097, p-value = 0.9171, mean 19.54, 19.62
t = -16.3419, df = 50.561, p-value < 2.2e-16, mean 1.1, 15.94**
**** Highly Significant at 95% Confident Interval**

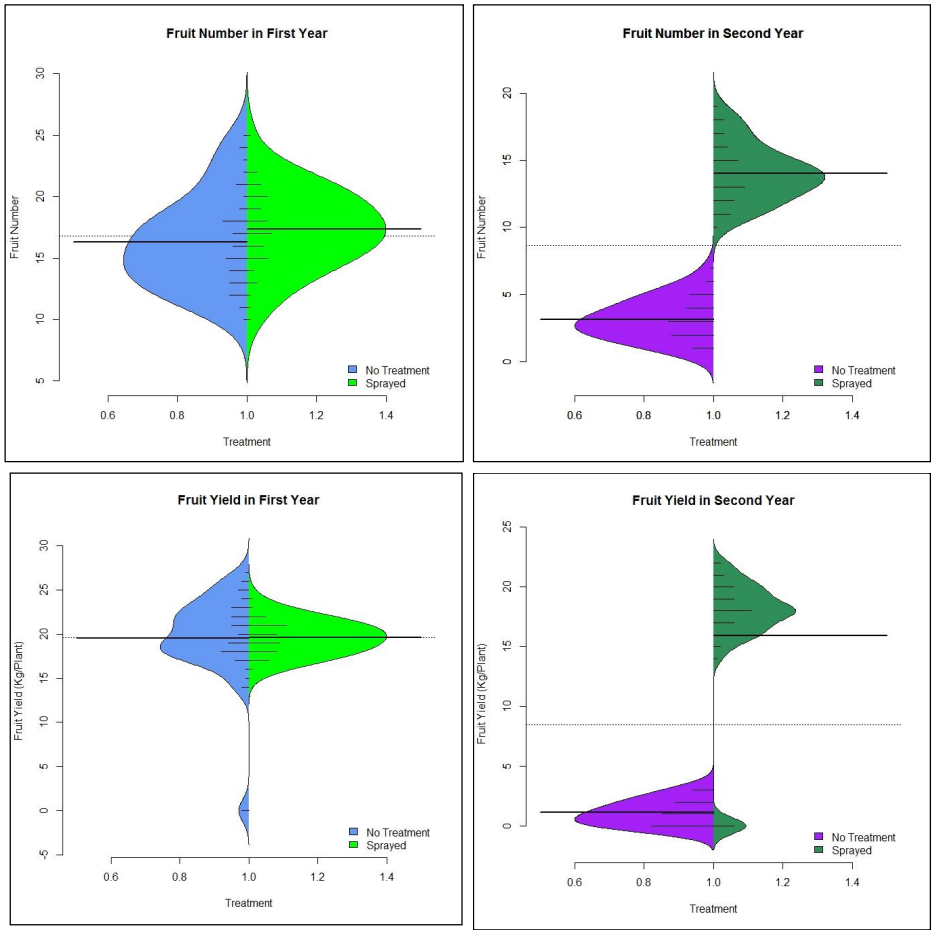

Fig 2. Bean Plots of Fruit Number and Fruit Yield in first and second years showing Distribution of values. (Skewness values 0.546, -0.107, 0.460, 0.371, -2.11, 0.09, 0.468, -1.946, Kurtosis values 2.61, 2.79, 2.60, 2.61, 9.39, 2.36, 2.02, 5.41)

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