Evaluation of the Efficiency of Weed Seed Separation from Crop Seeds Using the Seed Color Sorter

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Seed color sorter machine has the potential to help quarantine purposes by facilitating the separation of weed seeds from crop seeds. It separates weed seeds from crop seeds based on color differences with the help of Near Infra-Red cameras. The current study was conducted to evaluate the separation efficiency of 'Sinvec' seed color sorter with the appropriate speed level. This study was conducted at the National Plant Quarantine Service, Katunayake, during the period from September to December 2019. Three random samples of 500 g were taken from onion, radish, coriander, leeks, and carrot separately. Each sample was mixed with quarantine important weed seed mixture which was prepared using 5 quarantine weed seed species. 10 seeds from each weed species were used. Prepared samples were tested under 3-speed levels *viz.*, 55, kg hr^{-1}, 45 kg hr^{-1} and 35 kg hr^{-1}. The manual separation was followed to clarify the obtained results. Average separation efficiency was calculated using 3 replicates. The time taken for the machine to finish the sorting process was measured and the weight of rejected crop seeds of each machine test was also weighed. Data were analysed using the SAS university edition. Speed 45 kg hr^{-1} showed better performances compared to the other two speed levels. Under 45 kg hr^{-1} speed, the weed seed separation efficiency for coriander was 80-100%. Separation efficiency for leeks, carrot, onion, and radish was 73-100%, 76-100%, 50-86% and 46.7-90%, respectively. Always, the machine method consumed less time compared to the manual method. Drawbacks of seed color sorter were found during the study as it was unable to achieve 100% separation efficiency, Improper data feeding procedure, Malfunctioning with crop seeds treated with colored fungicides, highly sensitive to voltage variations, the higher weight of rejection, needs of proper technical knowledge to operate the machine. These findings will be useful in the future for the proper functioning of the new Seed Color Sorter in handling large seed lots.

Keywords: Seed colour sorting, Separation efficiency, Weed seeds, Quarantine