

Abstract

Sweet potato is a major source of dietary carbohydrate and a key food security crop in Kenya. Production of orange-fleshed sweetpotato (OFSP) in Kenya is constrained by sweetpotato virus diseases whose synergistic interaction between two virus families, sweetpotato feathery mottle virus (SPFMV) and sweetpotato chlorotic stunt virus (SPCSV). The absence of disease tolerant varieties contributes to yield losses of up to 98% that are currently observed. Research efforts in the past have concentrated on detection methods and epidemiological studies of viral infection. However, studies on the changes in quantitative contents of β -carotene, dry matter, iron and zinc to virus infection in the OFSP varieties is prerequisite to development of virus tolerant varieties. For this reason the current study aimed at determining the effect and interaction of multiple virus infection with β -carotene, iron and zinc levels in OFSP. Nitrocellulose membrane Enzyme-Linked Immunosorbent Assay was used to screen 10 viruses infecting OFSP. Reverse Transcriptase-PCR (RT-PCR) confirmed absence of SPCSV and SPFMV. Ninety virus free clones from six families were selected and planted in the field in a complete randomized design with three replicates. Natural virus transmission by vectors white flies (*Bemisia tabaci*) and aphids was allowed to occur. The plants were maintained until storage roots were formed. Clones with virus tolerance were selected. β -carotene was quantified on root samples using Ultraviolet spectrophotometer. Atomic absorption spectrum was used to quantify Iron and zinc. Dry matter was analysed using American Association of Cereal Chemists (AACC) method. Analysis of variance (ANOVA) for effect of virus infection on β -carotene, iron and zinc levels showed that there were no significant differences ($P < 0.05$) among all the means on the clones used. Data was analyzed by using ANOVA (SAS Inc. 2006) then separation of means using LSD. Regression analysis revealed that the average virus score did not have an effect on dry matter and micronutrients. ANOVA revealed significant differences in dry matter among families ($P < 0.05$). No significant differences were found among replicates. Among replicates and families, significant difference in iron content was identified ($P < 0.05$). Disease severity scores and zinc levels among the test samples were not significant among replicates and families. There was significant differences in β -carotene levels ($P < 0.05$) in families but not in replicates. Separation of means displayed significant differences in iron, dry matter content and β carotene levels among the test genotypes. The findings of the study will contribute and enhance the understanding of the effects of sweetpotato viruses on quality and quantity in

OFSP and enable development of virus tolerant varieties with quantified qualitative attributes.