Distribution and diversity of local strains of rice yellow motile virus in Tanzania

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Abstract

Rice (Oryza sativa) is a key staple in Tanzania but its productivity is affected by disease infestation, primary among which is the rice yellow mottle virus (RYMV). Tanzania possesses high RYMV densities and several locations including the Eastern Arc Mountains provide suitable habitat fragmentation that facilitates the diversification process of the virus. However, the distribution pattern and diversity of the local strains of RYMV remain largely unknown and this hinders progress in designing interventions. Efforts were, therefore, made to study the pattern and distribution of RYMV. Collection of isolates was made in May; recovery of virus on a susceptible elite line viz. TXD 220-1-3-3-1 was in June-July and molecular analysis was done in September-December 2005. The sequences of the coat protein (CP) gene of 23 isolates, representative of the three strains of RYMV found in Tanzania, were selected from 52 isolates collected from three regions. The phylogenetic analyses of the CP sequences revealed high (14.8%) nucleotide divergence between strains. Strain S6 was the most divergent with an intra-strain nucleotide divergence of 8.8%; this was consistent with its wide distribution in the region and particularly the eastern part of the Tanzania. Isolates of strains S4 were recorded for the first time in the eastern Arc Mountain region. These formed a monophyletic group with the Lake Malawi strain S4 sub-lineage (percentage identity of 95.4 to 96.8%) and differed from the Lake Victoria strain S4 sub-lineage by 4.5%. Coexistence within the same field of S4, S5 and S6 isolates was observed in the eastern Arc Mountains region. Strong competition between strains of RYMV was suspected from the limited distribution and rarity of strain S5. This study confirm speculations that the Eastern Arc Mountain region is the centre of origin of RYMV. Thus, the high viral load in the Eastern Arc Mountain imply that it is a suitable location for strategic studies aimed at designing control interventions against RYMV.