Aceria tosichella and its role in the transmission of wheat streak mosaic virus in Australia

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The wheat curl mite (WCM), Aceria tosichella Keifer, is a polyphagous eriophyoid mite, and the primary vector of wheat streak mosaic virus (WSMV) and five other viral pathogens in cereals. Using molecular markers and a series of laboratory experiments we found A. tosichella in Australia to consist of two genetically distinct lineages, which have broad overlapping distributions and differ in their ability to transmit WSMV under controlled conditions. This pattern of transmission also appears to be apparent in the field whereby a strong association between WSMV detection and a single WCM lineage has been detected. Using molecular markers we recently investigated the genetic structure of the Australian viruliferous WCM lineage. We assessed genetic differentiation of 16 WCM populations using 9 microsatellite markers. Strong evidence for extensive gene flow and low genetic structuring throughout Australia was evident, with an exception of Western Australian and far north Queensland populations that appear to be genetically isolated. The data also indicate genetic patterns consistent with an arrhenotokous parthenogenetic mode of reproduction. Implications of these findings are discussed with reference to the management of WCM and associated cereal pathogens in Australia and overseas.