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Mini Review

Incidence and disease control of *Zucchini yellow mosaic potyvirus*

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Abstract

Zucchini yellow mosaic potyvirus (ZYMV) was first identified in northern Italy. It likes other species of the family Potyuiridue. ZYMV has been recorded in many countries since 1981. The efficient intercontinental spread of the virus can be explained by international trading of infected seeds. Since coat protein (CP) analysis has become a primary method for taxonomic assignment of potyviruses the aims were to characterize this genomic region of ZYMV originating from virus-infected cucurbitaceous seedlings. Virus infection in cucurbits is typically associated with mosaic symptoms on leaves and lumpy, distorted fruit. The range of symptoms produced by each virus can overlap and plants are commonly infected by more than one virus at once. The viruses are spread by many species of aphids moving through or within a crop. Control options include: destroying old cucurbit crops as soon as harvesting is completed destroying weeds and volunteer cucurbits, within and around crops as these harbor the viruses and/or the aphids separating new crops from maturing crops as these will have high levels of virus infection avoiding overlapping crops of cucurbits.

More Information

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Introduction

Zucchini yellow mosaic virus (ZYMV) is a member of family Potyviridae and is considered the most economically important virus attacking cucurbit plants under field conditions [1]. The virus was isolated for the first time in northern Italy [2]. Soon after, it was identified in areas throughout the world where cucurbits are cultivated, including Mediterranean countries, Japan, Germany, Central Europe, China, Chile, Australia, Mexico, Mauritius, Canada and the USA [3,4]. This relatively new, but aggressive virus (member of the potyvirus group) has spread rapidly throughout the world, suggesting an efficient transmission from plant to plant by several aphid species in a non-persistent manner [5] and long distance distribution via infected seeds [6-8]. In Egypt, ZYMV was isolated from naturally infected squash plants [9]. Squash fruits (Figure 1) [1] exhibiting mosaic, blister and stunt symptoms (Figure 2) and squash fruits contain abscess were observed in Egypt. ZYMV like other species of the family Potyuiridue [5] is transmitted by aphids in a non-persistent manner [1]. The efficient intercontinental spread of the virus can be explained by international trading of infected seeds. However, the rate of disease transmission via seed is low and difficult to prove [10-12]. There is some evidence for seed transmission in the case of zucchini [6,7], buttercup squash [8] and hulless oilseed pumpkin [13,14]. This work focused on studying the seedborne virus transmission on hulless

Figure 1: ZYMV on squash fruits.

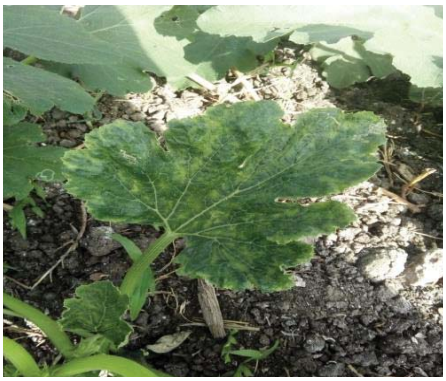

Figure 2: ZYMV on squash leaf.

oilseed pumpkin, the effect of storage time on the rate of virus transmission via infected seeds, and characterization of the virus isolates transmitted by seeds. Since coat protein (CP) analysis has become a primary method for taxonomic assignment of potyviruses the aims were to characterize this genomic region of ZYMV originating from virus-infected cucurbitaceous seedlings [15]. Virus infection in cucurbits is typically associated with mosaic symptoms on leaves and lumpy, distorted fruit. The range of symptoms produced by each virus can overlap and plants are commonly infected by more than one virus at once.

The role of aphids in spreading the viruses

The viruses are spread by many species of aphids moving through or within a crop. The aphids pick up the virus after feeding on infected leaves for only a few seconds and remain capable of spreading the virus for up to several hours after feeding. Winged apahids may be carried several kilometers by wind. In this way, small numbers of aphids are able to successfully spread the viruses to large numbers of plants. As a result, devastating crop losses can occur without significant numbers of aphids being observed. Most commonly, virus is spread by aphid species which do not settle and establish a colony within a crop but move from plant to plant, briefly tasting as they search for suitable host plants [1,16,17].

Disease control

All viruses can be managed using the same methods. As the greatest yield losses occur when plants are infected early in life, control measures are aimed at delaying and minimizing the levels of virus within crops. No single measure provides complete control and integrating multiple measures will provide better control. Control options include: destroying old cucurbit crops as soon as harvesting is completed destroying weeds and volunteer cucurbits within and around crops as these harbor the viruses and/or the aphids separating new crops from maturing crops as these will have high levels of virus infection avoiding overlapping crops of cucurbits, particularly zucchini arranging sequential plantings so that younger plantings are upwind of older crops separating crops, for example by using blocks of non-susceptible crops using resistant or tolerant varieties. These are available for all three viruses in pumpkin and zucchini using super-reflective plastic mulches, as these deter aphids from landing on leaves and can delay disease development in zucchini and other cucurbit species which do not rapidly cover the mulched area combing super-reflective mulches with weekly applications of stylet oil, applied to cover leaf surfaces thoroughly. Regular insecticide applications generally have little effect on the spread of these viruses, as it usually occurs with very short feeding times. Some insecticides actually increase virus spread as the chemicals agitate the aphids causing more frequent movement and feeding. Virus diseases are a worldwide problem of cucurbits and a major limiting Factor for cucurbit production approximately 35 viruses infecting cucurbits worldwide [18].

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