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Proposed disease severity assessment scale for dieback disease of passion fruit in Kenya

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ABSTRACT

Objective: Dieback disease is a major constraint to passion fruit production in Kenya. The disease gained epidemic status within 4 years of its first recording in 2004. It is estimated that the disease contributes about 70% of total fruit loss due to pre-harvest diseases in the country. Dieback exhibits a high level of complexity in its symptomatology, pathogenicity and epidemiology. The disease is new in Kenya and literature search does not show reports of its presence in other parts of the world where passion fruit is cultivated. These factors coupled with the lack of preparedness to natural calamities often seen in many African countries' agricultural settings have made it difficult to successfully manage dieback. In an effort to contribute to knowledge, upon which foundations of effective dieback management programs will be laid, a dieback disease severity assessment scale (scoring chart) was developed.

Methodology and results: The severity assessment scale was arrived at aided by data gathered through rigorous observations carried out by trained personnel for a period of time. Photographs were taken and documented to support the findings. The information was obtained from orchards in Eastern and Central Kenya which are among the highest passion fruit

producing regions in the country as well as being the major areas where dieback disease is most prevalent. Data on disease development were also collected from controlled experiments carried out at Kenyatta University. The controlled experiments simulated and provided evidence for the natural disease development trends observed under field conditions.

The assessment scale developed comprises of 5 scoring levels assigned over a range of disease severity as determined based on dieback disease symptoms.

At level 1, there are no symptoms observed hence plant is scored as 'healthy'.

At level 2, the disease is at the initial visible stages of establishment and its status is low. Infection is observed as discolored spots emerging along the vines; tendrils dry off at the terminals and spots may start appearing on the fruits.

At level 3, the disease status is moderately high, with spots on vines expanding into lesions that elongate but not yet encircle to girdle the bark on the vine. The proportion of brown spots on the fruits has increased significantly to cover between 25 and 50 % of the fruit surface. The tendrils have dried off in a dieback fashion (towards the vine) and some infected flowers exhibit wilting symptoms, withering before fruit formation.

At level 4, disease is at an advanced level with entire branches often on one side of the vines wilting, drying and dying off. The lesions on the vines have extended substantially to more than one inch long and have encircled the vine along the circumference in some parts, thus limiting the exchange of plant materials along the bark (phloem). If plant has been grafted on resistant yellow rootstock, infection is observed spreading downwards along the vine upto the graft union and in some cases spreading upwards on the opposite vine. At least 50% of

leaves on infected vines are wilted and drying up. Intense premature fruit drop is observed and few flowers mature to fruit initiation stage.

At level 5, over 75% of the foliage is wilted and dried up; the lesions along the vines have developed into open wounds with rotting of stem tissue and drying of bark observed around the oldest lesions. The plant is completely dead, or will soon be dead, and there are no chances of recovery regardless of measures taken.

Application of findings: This is the first published chart for scoring the important dieback disease on passion fruit. The scoring chart will assist researchers to assess the effectiveness of disease management measures and also help farmers to monitor spread of disease on their farms. The chart can be used to design informed disease forecasting and monitoring schedules that will be important in guiding the management options applied. It will be an important tool in effective dieback disease management programs to revive the passion fruit industry in Kenya.

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