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First Report of *Pestaiopisis Palmarum* Causing Leaf Spot on Kei-Apple (*Dovyalis caffra L.*) in Ethiopia

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ABSTRACT

Kei-apple (*Dovyalis caffra L*) is an indigenous evergreen spiny or shrub tree of southern Africa. It is currently grown in the arid and semi-arid regions of the world. The tree has a potential benefit as a critical component of the rural-urban landscape in Ethiopia. However, in 2021 leaf spots disease was observed on seedlings from different nurseries sites in Ethiopia. Initial symptoms included a small spot on the seedling leaves that enlarged and coalesced to give rise to larger irregular spots. Samples showing leaf spots were collected and isolated onto Potato Dextrose Agar (PDA) to identify the causal agent. Based on these morphological features, the fungus was identified as *Pestaiopisis palmarum*. Fungal colonies developed on PDA are copious white aerial mycelium covering the entire Petri dish area after 7 to 10 days, have a smooth edge, and thin mycelium. Conidia shape is fusiform to ellipsoid, mainly straight and septate. To confirm pathogenicity, spraying conidial suspension of the pathogen (105 spores / mL) was used. After 7 days, leaves developed symptoms that were similar to those seen in the field. On leaves sprayed with distilled water which is used as control, no symptoms were seen. *Pestaiopisis palmarum* was re-isolated from the inoculated and reconfirmed by morphological characteristics. This is the first report of *Pestalotiopsis spp* causing leaf spot disease of *Dovyalis caffra L*. in Ethiopia. This information is significant to further study and develop management strategies of seedling loss of *Dovyalis caffra L* in Ethiopia.

Keywords: Leaf spot, *Pestalotiopsis*, Pathogenicity, *Dovyalis caffra L*

INTRODUCTION

Kei-apple (*Dovyalis caffra L*.) is an evergreen spiny tree or shrub belonging to the family Flacourtiaceae. *D. caffra* is believed to be native to the Kei River area of southwest Africa. It is currently found in the dry, wooded grassland and forest edges of the arid and semi-arid regions of the world. Although it is difficult to specify its exact date of introduction into Ethiopia, *D. caffra* is known to have originated from one of the southern African countries.

Dovyalis caffra L. has numerous advantages. It has the potential to reduce land degradation since it flourishes in harsh environments where other types of trees struggle to survive. It is a drought-tolerant plant with diverse uses such as income from the sale of the fruit, cultivated as a fence or to form an impenetrable hedge while the leaves are used for nutrient leaching prevention, fodder and compost making and the flowers providing nectar and the trees shelter for a swarm or beehive [1].

Furthermore, Kei-apple has significant aesthetic and landscaping potential, Due to its strong thorns, Kei trees can be spaced close together to make an impenetrable hedge around homesteads, gardens, and croplands as a boundary, barrier, or support to keep out unwelcome animals.

Kei apple is also rich in compounds such as ascorbic acid, pectin, alanine, arginine, aspartic acid, and glutamic acid which results in balanced nutrition that contributes to improving animal output as well as reducing both the cost of production and the emission of greenhouse gases per unit of animal product. In this regard, Kei-apple leaves serve as fodder for goats, cattle, and wild game.

Planting of Kei-apple trees has a potential benefit as a critical component of the rural-urban landscape in Ethiopia. Nursery seedling propagation is crucial for the planting. Recently because its seedlings are easy to raise from seeds and develop reasonably quickly, the "Kei apple" has become a popular hedge in Ethiopia, where it is used as a live fence protecting 'homesteads, compounds of dwellings, and even farmyards.

Biotic and abiotic diseases are the main problem in forest nursery production. Although the literatures report the diseases of different nursery seedling tree species, diseases affecting Dovyalis caffra seedlings in forest nurseries have never been documented. However, in 2021 leaf spots disease was observed on seedlings from different nurseries sites in Ethiopia. The goal of this study was to identify the organisms found on affected *Dovyalis caffra L*. leaves and to confirm their pathogenicity on healthy leaves.

METHODS AND MATERIALS

Infected *Dovyalis caffra L*. leaves were collected from two government nursery sites located in the Amhara and Oromia regions. Samples were collected in June and July of 2021; these are periods of high relative humidity. Samples disease were stored in a paper bag and transported to the laboratory for isolation

About two centimetres of the infected seedling leaf tissue were excised with a sterilized razor blade at the point of progression of disease symptom; then surface sterilized by dipping into 70 per cent ethanol solution for 2 minutes. The tissues were then rinsed in three changes of sterilized distilled water and were allowed onto PDA (Potato Dextrose Agar) supplemented with 100 pp streptomycin to suppress bacterial growth in Petri dishes. The morphology of the culture was studied using both simple and compound binocular microscopes [2]. Details of the fungal colony, texture, and other important characteristics were recorded and matched with the cultural characters described in the literature for identification. Pathogenicity was studied on five healthy leaves collected from nursery-grown seedlings. The inoculation was made on sterile healthy-looking leaves by spraying conidial suspension of the pathogen (105 spores/mL) tested on the studied plant leaves. The control leaves were sprayed with sterile distilled water.

RESULTS AND DISCUSSION

In the year 2021, leaf spot disease of *Dovyalis caffra L*. seedlings was observed in the environment and forest research center nursery site, and then different nurseries found in Amhara and Oromia regions were surveyed for the occurrence of leaf spots. Most of the infected plants were observed from a humid environment. Initially, the spots appeared as minute dark brown dots, and then the lesions enlarged and coalesced to give rise to larger irregular spots. In severe foliage, infection resulted in leaves falling and tip dieback. The infected leaf was collected and carried to a laboratory and cultured, and the causal agent was identified. A total of 7 fungal isolates have similar morphology were obtained from the infected leaf of the seedlings. All isolates were identified as being *Pestaiopisis palmarum* based on morphological characters [3-5]. The colonies developed on PDA are white, a smooth edge and thin mycelium covering the entire Petri dish area after 7 to 10 days. Conidia shape is fusiform to ellipsoid, mainly straight and septate.

In the pathogenicity test, necrotic lesions resembling symptoms that occurred in the field were observed on an inoculated leaf. No symptoms were observed on leaves sprayed with distilled water.

However, the lesion observed on the inoculated leaf was not as large as the leaf collected from the nursery. This may be due to the favorable conditions for the growth of pathogens (Figure 1).

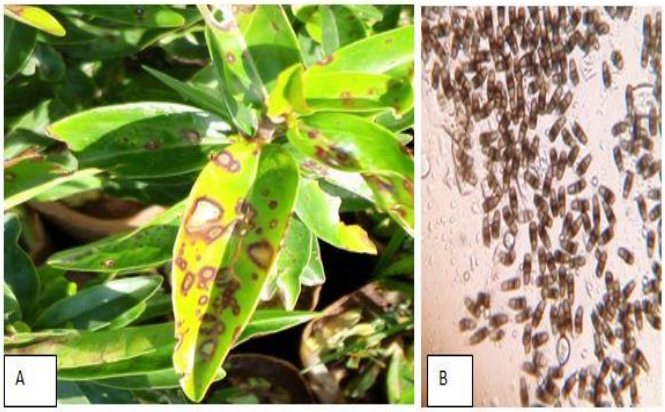

Figure 1: (A): Leaf spot symptom observed on the leaves of *Dovyalis caffra L*. (B): Microscopic appearance of the fungus.

Dovyalis caffra is an important tree grown in Ethiopia, as a live fence protecting 'homesteads, compounds of dwellings, and even farmyards and Ornamental [6]. Therefore, to encourage planting, good quality tree planting material, is needed. Leaf spot disease caused by *Pestaiopisis palmarum* may reduce the number and quality of seedlings for planting. According to Uchida reported, P. palmarum does not exhibit host specificity several plant species can be infected with this pathogen:

The *Pestaiopisis spp*. is a common fungal pathogen that causes leaf spot and other diseases in forest plants, ornamental plants, and Agricultural crops around the world [7-8]. *Pestalotiopsis spp* was also previously reported as the causal agent of leaf spot diseases on eucalyptus in Ethiopia.

CONCLUSION

Pestalotiopsis spp. has been identified as the causal pathogen of the leaf spot of *Dovyalis caffra L*. in Ethiopia. To my knowledge, this is the first report of *pesaliopisis spp*. on *Dovyalis caffra L* in Ethiopia. It is also the first report of this fungal species affecting the tree. This pathogen may inhibit or prevent seedlings' growth, kill seedlings directly or reduce the quality of the plant, which results in seedlings rejection. The use of infected seedlings in forest restoration programs can also cause establishment problems and reduced survival rates for the seedlings in arid areas. More research should be done on the disease's primary source of inoculum, how the pathogen spreads in the field, and the function of other fungi and alternate hosts in the disease's epidemiology.

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