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ECONOMIC IMPORTANCE OF FUSARIUM WILT OF CHRYSANTHEMUM

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Chrysanthemum flower (*Chrysanthemum indicum* Ramat) is popularly designated as “Queen of the east”, or autumn queen (as its bloom in November-December) (Shibata, 2008; Teixeira et al., 2013). *Fusarium oxysporum* f. sp. *chrysanthemi* (Foc) causing vascular wilt is one of the most devastating pathogens attacking Chrysanthemum. This pathogen bears a great ability to attack all the growth stages, ranging from nursery to flowering stages (Pinto et al., 2010). In terms of economic importance, Chrysanthemum plays a crucial role in supporting the livelihoods of rural communities through commercial cultivation, processing, and marketing of its highly valued fruits. From a nutritional perspective, Chrysanthemum are rich in antioxidants, vitamins, minerals, and dietary fiber, offering various health benefits such as improved immunity, digestion, and hydration.

Chrysanthemum {Chrysos = gold + anthemon or anthos = flower}, is a partly woody, erect, perennial herb or sub-shrub (up to 1 m in height). Botanically recognised as *Chrysanthemum morifolium* Ramat. and shares its roots to botanical family Asteraceae (Compositae). This beautiful flower is recognized as national flower of Japan, with several other popular names as, “Queen of the east”, or autumn queen (as its bloom in November-December) (Shibata, 2008; Teixeira et al., 2013) [17]. Chrysanthemum is commercially grown for its cut and loose flowers throughout the globe. This beautiful flower occupies the second position after rose in terms of global ornamental market value (Xia et al., 2006; Li et al., 2017). This floral crop is challenged by a vast range of biotic stresses such as, insects, fungus, bacteria, virus and viroid. But, among all the known diseases fusarium wilt caused by *Fusarium oxysporum* f. sp. *chrysanthimi* (Foc) is one of the most devastating disease. It is found to be a serious threat to commercial chrysanthemum cultivation around the globe including India (Singh et al., 2014). All the growth stages ranging from nursery to flowering stage are vulnerable to Foc attack (Pinto et al., 2010). This facultative saprophyte can survive

in soil up to six years in the absence of susceptible host. Survival of *Fusarium* spp. in the soil is generally by chlamydospores, which have the increased capability to endure harsh environmental conditions (Singh et al., 2014, Booth 1971, Nash et al., 1961) [15, 3, 10].

Hsieh (1985) reported that the pathogen was present in soil mainly from the surface to a depth of 20 cm and was detectable down to 30 cm. Considering the nature of damage and survival ability of the fungus, use of resistant varieties is the only economical and practical solution. But unfortunately, most of the resistant varieties have been found to be susceptible after some years because of breakdown in their resistance and evolution of variability in the pathogen. Hence, use of fungicides is the only available solution to cope up with this destructive pathogen. Keeping the importance of the pathogen and economic value of this crop in mind, present investigation carried out to find out best chemical fungicides and effect of different nano chemicals against this pathogen

Fusarium Wilt of Chrysanthemum

Fusarium wilt has become increasingly prevalent as a fungal disease in recent years. This soil-borne pathogen can persist in both soils and plants throughout the plant growth cycle, acting as a source of inoculum for subsequent seasons. For instance, *Fusarium* wilt in chrysanthemum (*F. oxysporum*) is known to initiate symptoms by invading the roots, subsequently obstructing vascular bundles, disrupting nutrient uptake, and ultimately resulting in symptoms like yellowing, wilting, and eventual plant death.

The *Fusarium* genus displays a broad host range and is responsible for over 100 plant diseases affecting various crops such as vegetables, fruits, cereals, pulses, and ornamental flowers. With more than 400 phylogenetically distinct species within the *Fusarium* genus (phylo-species), it stands among the top ten important plant-pathogenic fungi globally. *Fusarium* wilt in chrysanthemum has been documented worldwide,

Occurrence and Distribution: Chrysanthemum *Fusarium* wilt (CFW) is a devastating soil-borne disease affecting the cut chrysanthemum industry globally. In Vietnam, this disease has been occurring silently and is posing a risk of epidemic outbreaks in the southern provinces, especially Lam Dong. Results from a survey in 2023 showed that stunted growth, curved and small stems, dried-rot roots, leaf drooping and green or yellow wilting of plants after transplanting or at their flower bud initiation were common symptoms observed across the main chrysanthemum-growing farms in Lam dong.

Economic Importance: Fusarium wilt is a major economic concern for the chrysanthemum industry because it causes significant losses and continuous cropping obstacles:



Crop yield: Fusarium can decrease global crop yields by up to 50% each year.

Industry shifts: In the 1980s and 1990s, Fusarium wilt epidemics in Southern Europe caused the carnation industry to shift to countries like Colombia, Morocco, Kenya, and Tanzania.

Disease persistence: Fusarium wilt remains a critical disease for chrysanthemums, even though there are cultivars that are resistant to some races of *Fusarium dianthi*. Fusarium is a plant pathogenic fungus that can cause wilting and root-throat burning in plants. The causal agent of chrysanthemum wilt is *F. oxysporum* f. sp. *chrysanthemi*.

Symptomology

Fusarium wilt of chrysanthemum causes the following symptoms:

Leaves: Leaves turn yellow and fall off the plant. Leaves die from the base of the plant upwards.

Wilting: The plant wilts over a few days and eventually dies.

Stem and roots: When cut with a sharp knife, the water conducting tissue of the stem and roots turns reddish-brown.

Stunted growth: Infected plants are stunted and often don't produce flowers.

Rotting: Wilting can cause the base of the stem or the roots to rot.

Conclusion

Fusarium wilt, caused by *Fusarium oxysporum* f. sp. *chrysanthemi*, poses a significant threat to chrysanthemum cultivation worldwide, leading to severe yield losses and quality deterioration. Effective management of this disease requires a multifaceted approach, including the use of resistant cultivars, implementation of proper cultural practices (e.g., crop rotation, sanitation, and soil sterilization), and biological or chemical control strategies. Advances in molecular tools and disease diagnostics offer promising avenues for early detection and targeted intervention. Future research should prioritize the development of integrated disease management systems and environmentally sustainable solutions to mitigate the impact of Fusarium wilt on chrysanthemum production.

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