Journal of Saffron Research (semi-annual)
Vol.10, No.2, Fall & winter, 2022-2023
p. 285-294
http://dx.doi.org/10.22077/JSR.2022.5616.1195

University of Birjand

Original Article:

Etiology of corm rot of saffron in Khorramabad

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Received 04 September 2022; Accepted 10 December 2022

Extended Abstract

Introduction: Saffron (*Crocus sativus* L.) a perennial herbaceous is one of the most important crops. It is a valuable ketchup and its demand for consumption has been increased due to many medicinal and pharmacological applications. Saffron is a male sterile and can be propagated only by its corm and produces daughter corms. Cultivation of saffron is challenged by biotic stresses and corm rot as a biotic stress, is one of the most destructive diseases subterranean organs. Because of the insufficient information about corm rot etiology, investigation and identification of harmful agents is essential. Different pathogens such as fungi affect growth of corm and identification of these fungi is critical in cultivation of saffron. Occurrence of saffron corm rot has been reported from many countries and various microorganisms such as *Fusarium*, *Rhizoctonia*, *Sclerotinia*, *Penicillium*, *Aspergillus*, *Bacillus* and *Burkhulderia* have been isolated from rotted corm of saffron. The present study was conducted to identify fungi associated with corm of saffron in Khorramabad.

Materials and Methods: Infected corms of saffron were randomly collected from different regions of Khorramabad in Lorestan province (10 regions). The infected tissues were surface-sterilized with sodium hypochlorite (5%) for 1 min, and washed three times by sterile distilled water, dried on sterile filter paper and directly placed on the surface of potato dextrose agar medium. The PDA plates were incubated for 7 days at 25±2˚C and then were purified using single spore method. Morpho-cultural characteristics of fungi were studied on carnation leaf agar and potato carrot agar media. Microscopic measurement and images of reproductive structures were carried out under a Nikon microscope. Pathogenicity test was conducted to evaluate the ability of isolates to colonize saffron corms. Conidial suspension was prepared from cultured isolates on potato dextrose broth medium and adjusted at a concentration of 1×10^6 conidia/ml. To inoculation, saffron corms were submerged in the conidial suspension, then planted in an aseptic soil and maintained for 4 weeks under controlled conditions in a greenhouse with 23 ± 2°C and 70% relative humidity. The disease incidence and severity was inspected daily and finally Koch's postulates were tested.

Results and Discussion: Totally, 58 isolates were collected and four species including of *Alternaria alternata*, *Fusarium solani*, *F. acuminatum* and *F. oxysporum* were isolated and identified on the basis of morphological characteristics. The *A. alternate* (25 isolates) and *F. acuminatum* (4 isolates) were the most and the least frequent respectively. According to the pathogenic test under the controlled conditions, *F. oxysporum* was the most aggressive and *A. alternate* was weakly pathogenic. There was not previous report of incidence of *F. acuminatum* and *F. solani* on saffron corm from the world and Iran respectively. The results of this research are in agreement with previous studies that showed corm rot is a major challenge in saffron cultivation. Corm rot is a complex disease and frequency, diversity and distribution of pathogens may be different due to cultivar type, agricultural practices, and climatological parameters. However, *Fusarium* spp. are the main agent of corm rot and *F. oxysporum* is the most predominant in saffron growing areas of the world. Moreover, *Fusarium* spp. have been reported as serious pathogen of subterranean organs of many crops such as potato, rice, wheat, and barley.

Conclusion: The results of this study showed that corm rot is a serious constraint in saffron production. Although *A. alternata* was the most frequent species in rotted corms, *Fusarium* spp. especially *F. oxysporum* were more aggressive and virulent on saffron. In addition, isolating saprophytic fungi such as *Aspergillus*, *Penicillium* and *Rhizopus* in our research showed that saffron corm is potentially exposed to infectious by varous fungi. Etiology of saffron corm rot is essential and results of this study can be helpful in management of saffron cultivation.

Conflicts of interest: The authors declare no conflict of interest.

Keywords: *Alternaria*, *Fusarium*, Pathogenicity, Potato Dextrose Agar.

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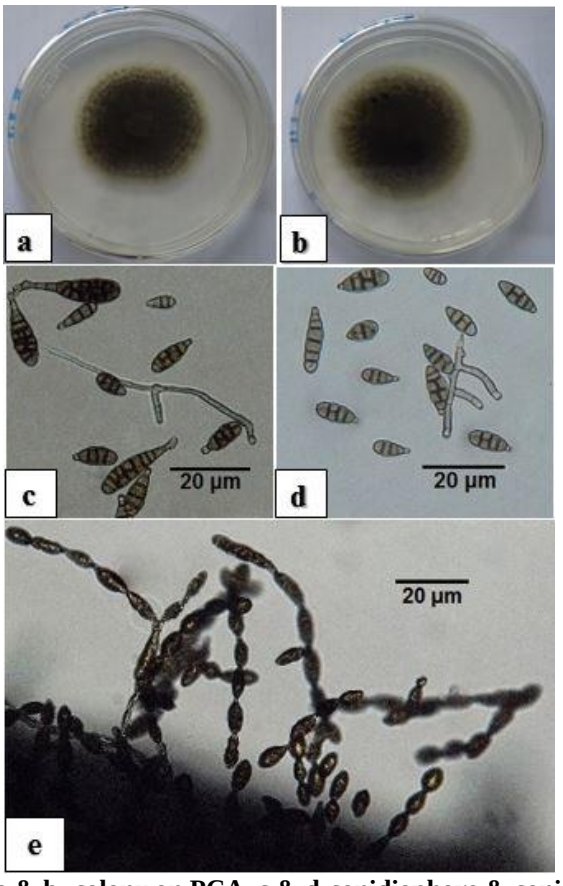

Fig 1. *Alternaria alternata*: a & b- colony on PCA, c & d-conidiophore & conidium, e-catenate conidium.

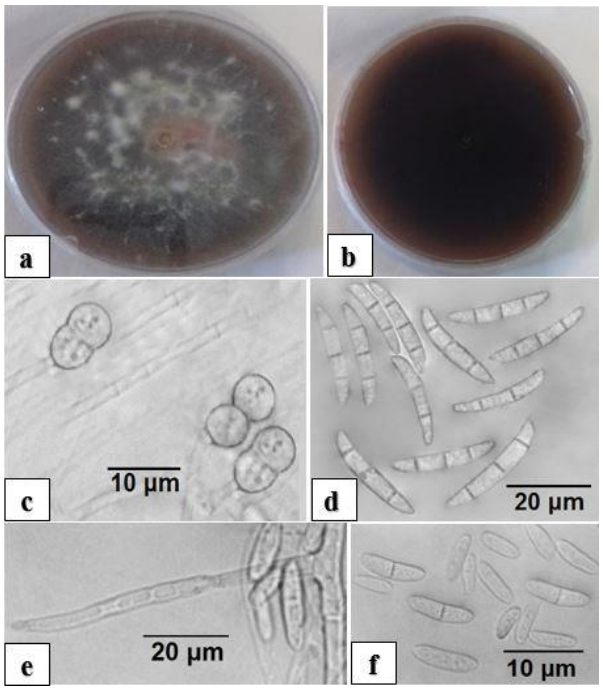

Fig 2. *Fusarium solani*: a & b- colony on PDA, c- chlamydospore, d-maroconidium, e-monophialid, f-microconidium.

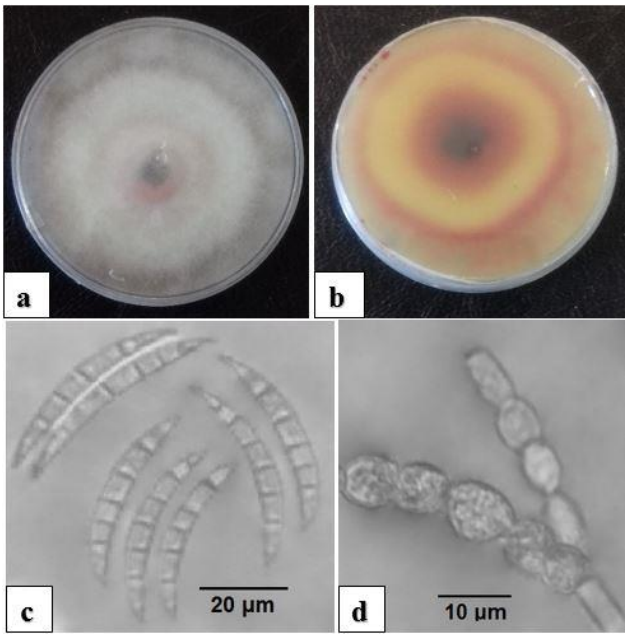

Fig 3. *Fusarium acuminatum*: a & b- colony on PDA, c- maroconidium, d- chlamydospore.

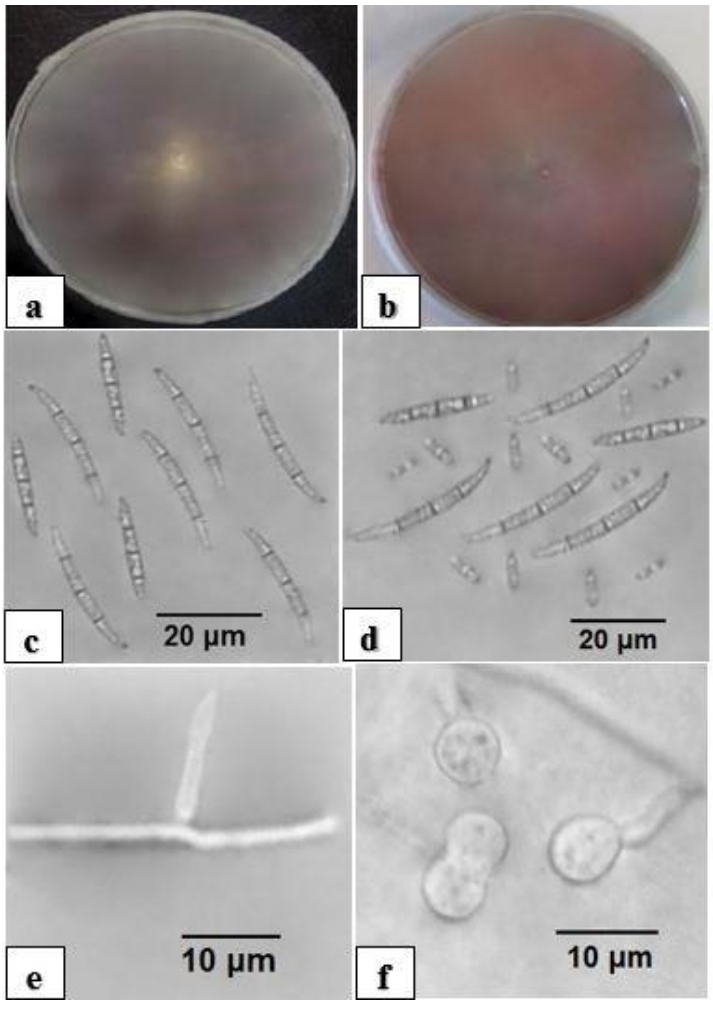

Fig 4. *Fusarium oxysporum*: a & b- colony on PDA, c- maroconidium, d- maroconidium & microconidium, e- monophialid, f- chlamydospore.

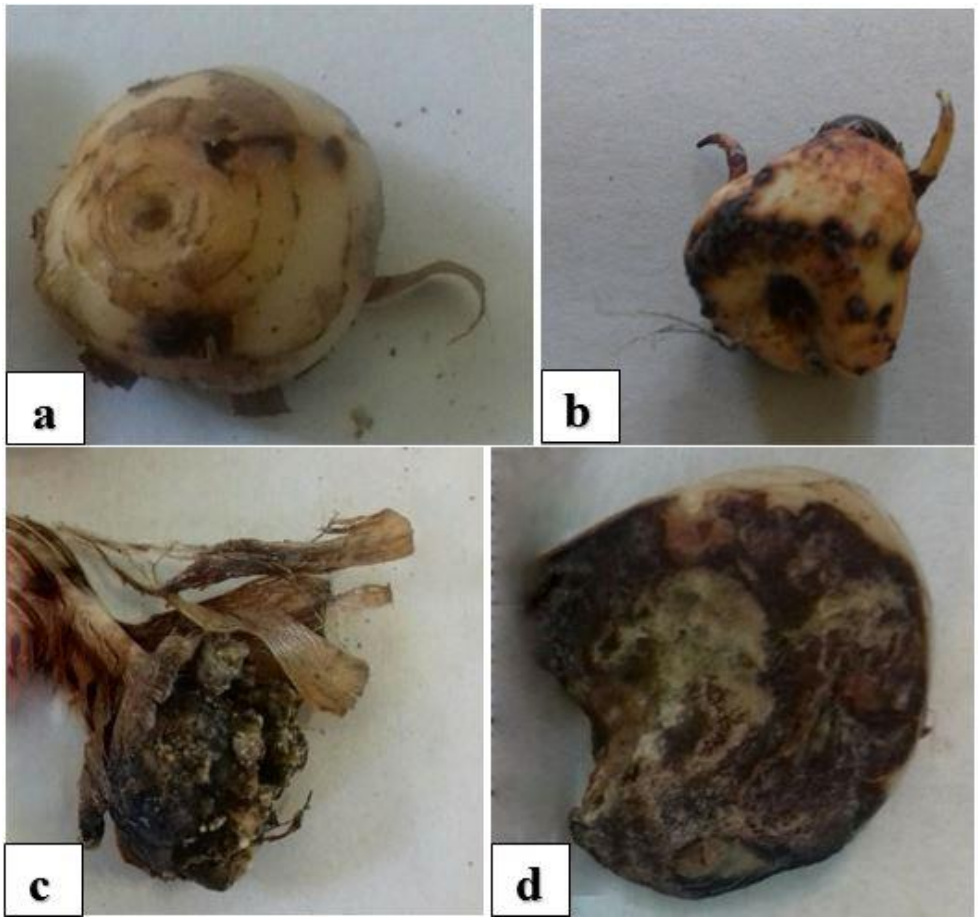

Fig 5. Results of pathogenicity tets of fungi on sffron corm, a: *A. alternate*, b: *F. acuminatum*, c: *F. oxysporum*, d: *F. solani*.