Chapter 8
Effect of Treatment of Corms With Trichoderma Inoculum on the Development of Crocus sativus Plants and the Formation of Daughter Bulbs

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ABSTRACT

In this study, an isolate of Trichoderma sp.1, collected from saffron corms, was utilized to evaluate its effect on saffron plant growth and bulb formation.Treating saffron corms with a conidial suspension of the Trichoderma isolate before sowing showed a positive impact on agronomic parameters and bulb formation. After four months of greenhouse cultivation, plants from Trichoderma-treated corms had an average of 31 leaves per plant, compared to 16,5 in the control plants. The average leaf length of treated plants was nearly identical to that of the controls.The average weights of leaves and roots in treated plants were 2,53g and 0,3g, respectively, compared to 1,93g and 0.15g in the controls.Furthermore, plants from Trichoderma-treated corms produced an average of about 10 newly formed bulbs, while

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control plants produced 5,75. The average bulb weight of treated plants was 16,5g, compared to 10,36g in control plants. These results benefit saffron producers by ensuring planting material availability. Trichoderma stimulates daughter corm formation, boosting production.

INTRODUCTION

Saffron (*Crocus sativus* L.) is a geophytic, sterile, hermaphrodite-like species that propagates vegetatively, forming female corms from the mother corms (Tahiri et al., 2022). These authors reported that several factors influence the multiplication of corms under natural conditions and thus limit the availability of planting material. Among these factors, both biotic and abiotic stresses impede bulb multiplication (Parray et al., 2012; Menia et al., *2018,*El Aymani et al., 2023). The spread of saffron also depends on human labor, as bulbs or corms must be manually removed, separated and replanted (Tahiri et al., 2022).

Research has reported that organic fertilizers used in the cultivation of *C. sativus* L. are more beneficial than chemical fertilizers. Organic fertilizers have been shown to increase the size of mother bulbs and improve flower yield (Koocheki and Seyyedi, 2015). Work by Tahiri et al. (2022) indicated that humic substances can improve saffron growth and development, but they have no significant effect on the formation of daughter corms.

In recent years, several microorganisms, such as *Trichoderma* spp., *Pseudomonas fluorescens* and *Bacillus* spp., have been identified as potential candidates to stimulate growth and protect saffron against telluric diseases. Sharaf-Eldin et al. (2007) reported that the application of the PGPR bacterium *Bacillus subtilis* offers significant advantages for saffron producers by accelerating bulb growth, increasing biomass output, and enhancing the contents of chemical components (crocine, safranal, picrocrocine, and crocétine). Additionally, according to Gupta and Vakhlu (2015), PGPR can also be used as a biofungicide for bulb rot diseases in *C. sativus.*

The use of microbial inocula composed of PGPR bacteria (Pérez-Montaño et al., 2014) and arbuscular mycorrhizal fungi as biofertilizers represents a potential means of reducing the negative environmental impacts resulting from the continued use of chemical fertilizers, contributing to sustainable agriculture. In this context, El Aymani et al. (2019a) and Ourras et al. (2021) reported that the rhizosphere of saffron plants is rich in arbuscular mycorrhizal fungi. Inocula based on these endomycorrhizal fungi have shown biostimulating effects on root growth, leaf number and length, and the number of female corms. Some of these inocula promoted the sporulation of arbuscular mycorrhizal fungi at the root and rhizosphere levels of saffron plants (El Aymani et al., 2019b and 2023; Ourras et al., 2022).

Trichoderma are fungi commonly used in agriculture and horticulture for its various beneficial properties. They are known for their ability to promote plant growth (Hmouni et al. 2006, Mouria et al. 2008, Sghir et al. 2014; Sellal et al., 2020 and 2024; Khirallal et al. 2017; Kribel et al., 2020; El Kaissoumi et al., 2024; Mouden et al., 2023) and their protection from land-based bioaggressors, as biological control agents acting primarily through the production of antimicrobial compounds or by parasitism of plant pathogens (Mouria et al., 2013, 2015; Qostal et al., 2020; Kotba et al., 2022; El Kaissoumi et al., 2023; Errifi et al., 2024; Adnani et al., 2024). Inoculation with *Trichoderma* is therefore an interesting approach to develop in order to reduce the use of chemical inputs and pesticides, especially when it comes to the cultivation of local products and organic farming. This is precisely the case for the cultivation of saffron in the Talouine-Taznakht region, where the concern to improve the productivity of the crop should go with a better valorization of the product, saffron, Morocco, as organic and high quality product.