Chapter 23
Safran (Crocus sativus L.): A Bibliographic Review

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ABSTRACT

Crocus sativus L. (saffron) is one of the most expensive and rarest spices in the world, used as a dye, flavor, and for medicinal purposes. Saffron cultivation in Morocco is an important economic activity in the mountain regions of Taliouine (Taroudant province) and Taznakht (Ouarzazate province), covering an area of one hundred and five hectares. Morocco is renowned for its high-quality saffron nationally and internationally. The Corcus sativus plant has a life cycle whose duration and phases depend on several biotic and abiotic factors. Sometimes these factors limit and negatively affect the availability of corms as well as the durability of growing saffron in the Taliouine-Taznakht region. To cope with constraints related to these factors, the use of biological inputs such as arbuscular mycorrhizal symbiotes captures the interest of scientists and the public. Mycorrhizal fungi had a positive impact on saffron culture, mainly by increasing crop productivity. They allow better mineral nutrition in plants including phosphorus, nitrogen, zinc, copper, manganese, and iron.

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1. INTRODUCTION

The spice saffron is made from the plant known by its botanical name, *Crocus sativus* L. Because of its dried stigmata's color, bitterness, and aromatic potency, saffron has long been considered the most fascinating and alluring species, (Salwee, Yasmin, & Nehvi, 2013). It is the priciest spice in the world (Fernández, 2004) because primary management methods like flower planting, upkeep, and harvesting are carried out manually. This is on top of the low yield of this spice, which is also ascribed to genetically homogenous planting material and antiquated agricultural techniques, (Muthukumar & Prakash, 2009). Researchers and farmers ignored saffron for a long time because they thought it was a secondary crop meant only for agricultural diversification. Nonetheless, it has assumed a more intriguing role in low-input agricultural systems, like organic farming, in recent years.

Among the endomycorrhizae, the earliest and most prevalent kind of mycorrhizae, are arbuscular mycorrhizal fungi (AMF). Approximately 80% of the earth's roots form associations with AMF, (Garbaye, 2013) (El Gabardi *et al.,* 2024). AMF can be found in most flowering plants, ferns, lycopods, several conifers, monocotyledons, and dicotyledons, (Fortin, Plenchette, & Piché, 2008). They provide better mineral nutrition in plants including phosphorus, (Ait-Ouakrim *et al.,* 2023a) (Ait-Ouakrim *et al.,* 2023b), nitrogen, (Subramanian & Charest, 1997) (Hawkins, Johansen, & George, 2000) (Toussaint, St-Arnaud, & Charest, 2004) (Tanaka & Yano, 2005) and other essential cations like iron, manganese, copper and zinc, (Merieme *et al*., 2022).

This bibliographic review aims to provide various facts about the plant *Crocus sativus* L. Thus, the following aspects of arbuscular mycorrhizal fungi have been clarified: Morocco's diversity, taxonomy, life cycle, and benefits to the host plant of arbuscular mycorrhizal fungi.

2. *CROCUS SATIVUS* L. (SAFFRON)

2.1 Generality

The sterile plant saffron is a perennial herbaceous plant belonging to the Iridaceae family that grows vegetatively through corms, a bulb-like reserve organ, (Brighton, 1977) (Mathew & Brighton, 1977). Only in clusters do these corms multiply, and because of human intervention, the corm "tufts" are divided, (Lilia, Warda, & Kadir, 2017). Each mother corm produces several corms from lateral buds and two to three principal daughters from apical buds, depending on its size, (Mathew, 1982). Parallel fiber tunic-coated bulbs are well-suited to withstand harsh winters and scorching summers, (Agayev, Zarifi, & Fernández, 2010).

Greek word "krokos" which means filament, is the source of the word "*crocus*" comes from, by reference to the stigmata of the plant. The word "saffron" is of Arabic origin "zafaran," meaning "to colour with saffron," and is derived from "yellow" asfar and "safra" asfar, (Katzer & Saffron, 2001) (Crozet, 2012). The term "*sativus*" means "cultivated," because the vegetative of *Crocus sativus* (Dupont, 2001) requires the hand of man, (Algrech, 2001).

For over 5000 years, saffron first appeared in the Persian plateaus and high valleys of Kashmir. It was then spread throughout the Mediterranean, in the wake of successive empires before the Roman Empire (Melnyk, Wang, & Marcone, 2010), and cultivated for the first time in the Greek provinces, (Mcgee, 2004). Saffron originates from the Persian regions that make up Iran today.