

# 116° Congresso della Società Botanica Italiana

VII INTERNATIONAL PLANT SCIENCE CONFERENCE (IPSC)

ONLINE, 8 - 10 SEPTEMBER 2021



## ABSTRACTS

KEYNOTE LECTURES, COMMUNICATIONS, VIDEO ABSTRACTS

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**11 = Biocontrol of *F. oxysporum* in *Crocus sativus*: a case study of “Zafferano dell’Aquila DOP”**

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Saffron (*Crocus sativus* L.) is an autumnal flowering geophyte well known for its dried stigmas, with flavouring, colouring and bioactive properties. Italy is one of the most important producing countries, with several protected designations of origin - DOP. Among the latter, the “Zafferano dell’Aquila DOP” is cultivated in L’Aquila territory (Abruzzi, Central Italy). Saffron cultivation is obtained by corms planting during their dormant period in summer (August) and flowers are produced after 8–10 weeks in autumn (October–November). After harvest, saffron plants are left in the soil undisturbed and allowed to grow throughout the winter. In the spring, 4–10 daughter corms are formed above the old ones, which shrivel and eventually rot away. Since the corm, as a sub-terranean organ, is susceptible to diseases caused by fungi, bacteria, nematodes, and viruses, the new corms are harvested and subjected to chemical disinfestation treatment before replanting. However, many fungal pathogens are resistant to this treatment. *Fusarium oxysporum* ff. spp. is one of the most destructive fungal diseases, which led to severe yield losses. The main symptoms of the disease occur during the flowering period in which infected plants show a dropping, yellowing, and wilting of shoots, basal and corm rot. The pathogen survives in infected corms and soil as mycelium, chlamydospores, macroconidia and microconidia, spreading increasingly all over the crops. Plant-microbe interactions can increase crop resistance toward phytopathogens and the use of bacteria inoculants is a valid strategy for the biocontrol of several plant diseases.

In this perspective, the present work aimed at: i) isolate strains of *F. oxysporum* from soil and rotting corm; ii) evaluate the inhibition ability of selected strains of bacteria against *F. oxysporum* ff. spp.; iii) obtain an *in vitro* culture of saffron corms free of pathogens to conserve the “Zafferano dell’Aquila DOP” crop. Pathogenic *Fusarium* strains have been isolated from soil and corms of “Zafferano dell’Aquila DOP” plants with *Fusarium* wilt. After isolation, the fungal strain identification was carried out based on morphological and molecular characterizations and pathogenicity assays. Selected plant growth-promoting bacteria (PGPB) with interesting biocontrol properties were tested *in vitro* against *F. oxysporum* ff. spp. by dual culture and microscopic observations. The “Zafferano dell’Aquila DOP” corms were also subjected to surface sterilization, explant cultivation, and multiplication on Murashige and Skoog medium (MS), enriched with 6-benzylaminopurine (BAP – 400 µg) and 1-naphthaleneacetic acid (NAA – 100 µg).

Three different strains of *F. oxysporum* (FIS1, FIS2, FIS3) were isolated and identified as *formae speciales* responsible for saffron wilt. Five PGPB strains (*i.e.* *Bacillus pumilus*, WB1, WB2, WG6, BC6 AII) presented a good *in vitro* biocontrol activity against all *F. oxysporum* isolates, showing the capability to induce hyphae disgregation and vacuolization. The *in vitro* tissue multiplication also allowed the establishment of a “Zafferano dell’Aquila DOP” free of pathogens culture.

The selection of plant growth-promoting bacteria (PGPB) as promising biocontrol agents could help to counteract the *Fusarium* threat. While the establishment of an *in vitro* free of pathogens culture could help the conservation of this important DOP. Future studies should be directed towards the *in planta* biocontrol ability of the selected PGPB strains to counteract *Fusarium* wilt and the *ex vitro* cultivation of saffron corms. In any case, these preliminary results represent a valid basis for future investigation on the valorization and protection of an important and valuable plant.

<https://drive.google.com/file/d/1JrbEbFw-K0XnVabVi227ILL0bZaE43Sk/view?usp=sharing>