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# SOLVING THE SEX DILEMMA IN TRUFFLES BY A GENOME-BASED APPROACH

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*Tuber melanosporum* and *T.magnatum* are ectomycorrhizal ascomycetes producing edible ascocarps, known as black and white truffles, respectively. These species are highly praised worldwide for their intense bouquet, and their market is steadily expanding. Yet, most of the ecological and biological aspects that govern truffle life cycle remain still largely unknown. In particular, gaining direct evidence on the mating strategies that control the production of their prestigious ascocarps is hampered by the impossibility to mate these fungi under controlled conditions. Thus, truffle sex is a long lasting dilemma for mycologists.

Caryological and molecular data have conveyed the idea that truffles strictly self and have a prevalent diploid/dikaryotic phase in their life cycle (1,2). In departure from this view, we have recently produced SSR-based evidence for the prevalence of the haploid phase in the truffle life cycle and the occurrence of outcrossing in both *Tuber melanosporum* and *T.magnatum*. (3-5). Despite this new finding, however, the hypothesis of selfing in *Tuber* spp. is far from being settled. Indeed, the possibility that truffles are homothallic and facultative outcrossing species, switching from one reproductive tactic (selfing) to the other (outcrossing) according to external stimuli is still plausible (6).

The sequencing of *T. melanosporum* genome (*Tuber* Genome Consortium: http://mycor.nancy.inra.fr) is in progress (7, 8). Within the frame of this bilateral French-Italian genome project we have studied the structure and organization of mating (MAT) genes in this species.

Here we show that *T. melanosporum* is an heterotallic fungus: the structure and organization of *T. melanosporum* MAT genes highly resemble those of other heterothallic ascomycetes with two MAT idiomorphs harbored by different mycelial strains.

This finding is practically very relevant in that it paves the way to a profound re-evaluation of *T.melanosporum* cultivation and conservation strategies. Not only the sequencing of *T.melanosporum* genome has allowed us to resolve the dilemma concerning the sexuality in this species but also it provides mycologists with genetic tools to successfully tackle this critical issue in other *Tuber* spp.

References

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