Proceedings of the XLIX Italian Society of Agricultural Genetics Annual Congress
Potenza, Italy – 12/15 September, 2005
ISBN **88-900622-6-6**

Poster Abstract - C.55

SSR MARKERS AND POPULATION GENETIC ANALYSES TO SHED LIGHT ON THE REPRODUCTIVE SYSTEM OF WHITE TRUFFLE TUBER MAGNATUM

A. RUBINI, C. RICCIONI, S. ARCIONI, F. PAOLOCCI

National Research Council, Plant Genetics Institute, Perugia division, Via Madonna Alta 130, 06128 Perugia, Italy - andrea.rubini@igv.cnr.it

Tuber magnatum, SSR, reproductive mode

Tuber spp. are ectomycorrhizal ascomycetes producing hypogeous fruit-bodies known as truffles. Thanks to the distinctive taste and aroma, the truffles of some *Tuber* spp. are appreciated and marketed worldwide.

Setting aside the beneficial effects of the mutualistic symbiosis on forest tree growth and nutrient uptake, many attempts have then been made to promote the cultivation of these fungi through the use of nursery-inoculated mycorrhizal plant and fulfil their market demand. Encouraging truffle productions have been obtained for some species such as *T. melanosporum* Vittad. Conversely, the finest white truffle *Tuber magnatum* Pico is still harvested exclusively from natural truffle grounds. Estensive research work is needed not only to understand ecological requirement specific to each species/strain but also to shed light on basic aspects of truffle biology, such as their reproductive system.

The few studies of genetic structure and mode of reproduction of *T. magnatum* have reported a very limited intraspecific variation and an apparent absence of heterozygous individuals (3, 4). Based on the assumption that truffles are formed by diploid/dikaryotic hyphae these results have been explained as a consequence of a strict self reproductive system in *T.magnatum* as well as in *T. melanosporum* (1 e 2). However, the fruit bodies of most ascomycetes are formed by uniparental - haploid hyphae.

In the present study we aimed to shed light on reproductive mode of *T. magnatum* by using microsatellite markers (5) and an extensive truffle sampling (316 specimens grouped into 26 populations) to evaluate the occurrence of a genetic exchange within and among populations. Pairwise and multilocus linkage disequilibrium analyses revealed the existence of an extensive gene flow within local populations (6). We interpreted these data to mean that *T.magnatum* is an out-breeding species and its fruit bodies are mainly formed by haploid hyphae.

This study provides the first evidence suggesting that truffles are not strictly selfing organisms and should result in a significant reevaluation of the life cycle and biology of *T.magnatum* and other *Tuber* spp.

References

1. Bertault G., *et al.* (1998) *Nature* 394, 734
2. Bertault G., *et al.* (2001) *Heredity* 86, 451
3. Frizzi G, *et al.* (2001) *Mycol. Res.* 105, 365-369.
4. Mello A. *et al.* (2005) *Env. Microbiol.* 7: 55-65.

5. Rubini A., *et al.* (2004) *Mol. Ecol. Notes* 4, 116
6. Rubini A., *et al*. (submitted).