

24-26 October 2012 - Bari - Italy

PROGRAMME & ABSTRACTS



International MPU Workshop 2012
Plant Protection for the Quality and Safety of the
Mediterranean Diet

MEDITERRANEAN
PHYTOPATHOLOGICAL
UNION



SEED TREATMENT OF DURUM WHEAT KERNELS WITH ESSENTIAL OILS: 3 YEARS OF FIELD TRIALS

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Wheat crop is exposed to several fungal diseases that could represent a critical problem for successful production at both quantitative and qualitative level as they can cause severe losses in grain production, decrease in grain qualitative features and sanitary problems related to the presence of mycotoxins. In particular, wheat "root and foot rot", a seed/soil borne fungal disease causing seedlings browning and rot, represents a very common problem in Italy, and the use of healthy seeds as well as antifungal seed treatments has become a necessity.

Thyme and tea tree essential oils have been proved to possess antifungal activity and in this study the efficacy of these two oils for durum wheat seed treatments against "root and foot rot" was tested.

Here we present the results from 3 years of field trials, in which different kind of oils seed treatments such as liquid and spray treatment were tested on durum wheat cv. Simeto, and compared with conventional (chemical) and organic (copper) treatments: liquid treatment was performed by seed immersion in aqueous solution containing the oil, while spray treatment was performed applying a special biodegradable polymer of polysaccharides as protector and oils vehicular. Germinability tests and phytosanitary analysis of kernels treated and not treated were carried out for each trial before sown as preliminary analysis and allowed to find the oils phytotoxicity threshold for seeds and the best solution concentration which combines the lowest toxic effect and the highest antifungal efficacy, evaluated by blotter test method.

Field trials were conducted following the randomized block design (3 units repeated) in two fields under different conditions: one with no stress condition, and the other with high infective pressure obtained by artificial inoculation of kernels with a conidial solution of *Fusarium graminearum*, one of the main causal agents of the root and foot rot in wheat. Data collected during these trials concerned the amount of emerged plants and the incidence and severity of the disease evaluated by the symptoms analysis (Mc Kinney index). Besides, during the second year-trial, the yield in kernels was estimated to verify the possible effects of essential oil seed treatment on crop production.

Results showed that seed treatments with thyme and tea tree oils reduced the number of seeds infected, didn't penalize plants emerging, improved the crop production, and reduced root and foot rot severity on seedlings, achieving maximum results in presence of high infective pressure, with efficacy comparable with organic control treatments. The two typologies of treatment tested, liquid and spray, gave similar results, confirming that seed treatment with thyme and tea tree essential oils is effective in containing pathogens transmitted by seed and in protecting seedlings in the first stage from soil pathogen attacks, and could represent an alternative to the use of chemicals in order to preserve the food and environment safety.