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Guest Editorial

Fire and soils: Methodological issues and implications to management

Although their natural role in the ecosystems, wildfires are of increasing importance day-by-day since not only its frequency but also the intensity has currently increasing (Pausas and Keeley, 2009). Under the changing fire regimes of our time period, the need for studies more in quantity and in quality on the effect of fire on soils, such as soil chemistry and biology, surface processes, and soil physical properties has been arisen (for comprehensive reviews, see DeBano, 2000; González-Pérez et al., 2004; Certini, 2005).

The meeting series of Fire Effects on Soil Properties were started in Barcelona, Spain, in 2007 (Úbeda and Mataix-Solera, 2008). The meeting has fulfilled the needs for a specialized congress on soil–fire relationships, and attracted the researchers from different disciplines of fire science. The meeting series allows spreading new methodologies, increasing collaboration between scientists from different disciplines and countries, and sharing of up-to-date information on scientific basis in relation to fire effects on soils.

The second edition of "International Meeting on Fire Effects on Soil Properties" was held in Marmaris, Turkey between 11 and 15 February 2009. The Meeting was co-organized by Ecology Group at Department of Biology in Hacettepe University and Department of Soil Science in Ankara University. The meeting was financially supported by "the Scientific and Technological Research Council of Turkey" (TÜBİTAK). "The International Journal of Wildland Fire" and "Gökova Municipality" also gave support for the Meeting.

The main themes of the Meeting comprised different aspects of soil–fire relationships including "fire effects on hydrology and soil physical properties", "fire effects on organic matter content and soil chemical properties", "new methodologies to study fire effects on soils", "fire intensity and fire severity measurements, soil recovery after fires", "fire effects on soil erosion", and "fire effects on organisms related to soil".

A total of 70 participants including scientists from 9 countries (Australia, France, Great Britain, Greece, Israel, Italy, Portugal, Spain, and Turkey), students from Turkish universities, and members of local forestry services attended the Meeting. Three invited, 30 oral and 35 poster contributions were presented. Although the ongoing global economical crisis before and during the meeting dates, it was delighted to see the international interest to the Meeting.

Methodological issues were the leading subject of the Meeting. There is variety of techniques to be used to study soil–fire relationships, although time and budget can be limiting factors.

Beyond the traditional study techniques, the novel ones are promising to see not only to evaluate post-fire soil conditions better, but also to help land managers to mitigate the fire effects on soils. Fortunately, most of the contributions of the Meeting used such new techniques on their methodology, or directly, they were the presentation of the novel ones. The methodological issues presented and discussed during the Meeting were including the ecological and chemical indicators of ecosystem functioning after fires, the usage of ash colors to detect fire severity, the markers found in the soil indicating past fires, mapping techniques of soil temperatures during fires, the usage of GIS modeling for estimating post-fire potential soil losses, and new indirect analysis methods of post-fire soil properties. Some of the current methodological approaches were also discussed in a new fashion such as the scale-dependency of post-fire runoff and erosion rates, and the sensitivity of soil quality indices to heating temperatures.

Second, but not the less, important issue dominated the contributions of the Meeting was the implication of the results from empirical scientific studies on fire effects on soil properties to the management practices. During the last decades, fires have created more environmental problems, especially due to the ongoing global changes such as land-use and climate changes (Pausas et al., 2008; Bowman et al., 2009). This made the fire management an important subject, resulting in the scientific interest on management issues increased in fire science (e.g., Inbar et al., 1997; Robichaud et al., 2008). In our changing world, soils also need to be managed before and after the fires. This is the only way to mitigate the effects of fires higher at frequency and in severity on the soils. The contributions of the Meeting showed us that integrating new methodologies to the studies on soil–fire relationships may help to achieve this aim, and may lead future practices of soil management as well.

This special issue for the Meeting includes six valuable contributions. Not surprisingly, three of them are related to new methodologies whereas the rest have important implications to the management.

Vergnoux et al. (this issue) investigated the polycyclic aromatic hydrocarbons (PAH) levels and distribution in the soils at sites with different fire frequencies and with different time elapsed since last fire. As a result of their work, they propose a new index to use as an estimator of the time passed since the last fire, and as an indicator of soil remediation.

Castro et al. (this issue) shows a good example of how Fuzzy Boolean Nets and Fuzzy reasoning can be used in the studies on the effect of prescribed fire on soil properties. This method let them to obtain measures of the variation at the soil chemical properties qualitatively under the condition of lack of enough quantitative data, rather than quantitative exact measures.

In their second contribution to this special issue, Vergnoux et al. (this issue) studied the post-fire changes of humic substances which are important components of soil organic matter, and reported the response of several humic substances to fire. The well-organized sampling design of their study has also potential to

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affect the sampling approaches of post-fire recovery studies in Mediterranean ecosystems.

Leite et al. (this issue) documented the fire regime of an area where large fires are relatively recent events, both in spatial and temporal terms. For the studied area, their study makes valuable contribution to the management of forests.

Malvar et al. (this issue) showed the patterns of runoff, soil loss and organic matter loss after fires in *Eucalyptus* stands under different rainfall intensities created via rainfall simulation experiments. They obtained interesting results for post-fire management of these commercial forests.

Pereira et al. (this issue) worked the effect of prescribed fires on ash properties and soluble elements, a topic lacking of studies although its importance for plant growth and ecosystem restoration. Their study has considerable implications to the post-fire management of *Quercus suber* forests.

We believe that the Meeting was an important one contributing to our knowledge, since it includes the studies not only using new methodologies on fire–soil relationships, but also giving noteworthy implications to management from science. Considering the triggering effect of the Meeting for the collaboration among scientists from different fields, it is not unlikely to expect more contribution to science and management at the future meetings of the series.

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