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Interactive comment on "Experimental drought induces short-term changes in soil functionality and microbial community structure after fire in a Mediterranean shrubland" *by* M. B. Hinojosa et al.

Anonymous Referee #3

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The manuscript "Experimental drought induces short-term changes in soil functionality and microbial community structure after fire in a Mediterranean shrubland" (Hinojosa et al.) concerns an interesting ecological topic. However, experimental design is not persuasive. The authors hypothesize that "drought conditions after fire will reduce microbial biomass recovery and modify functionality and diversity of soil microorganisms either survivors or colonizers after fire" (lines 9-11, p.15254). However, the study did not start immediately after fire (September 2009), but about six months later (spring 2010), so that the most critical period was not investigated. Indeed, drought could have a more negative effect immediately after fire, when soil is deprived of litter and plant cover, than later, when probably plants begin to recolonize soil, by protecting it

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from direct solar radiation and so reducing the water evaporation. However, the authors did not specify if fire totally removed plants and litter neither if, and to what extent, a plant recovery occurred in burned plots during study period. This information is necessary to interpret the results of this study. Moreover, microbial community could be affected by drought immediately after fire more than later, when it probably recovered, at least in part, after direct and indirect action of fire. Also soil chemical properties may be different immediately after fire than later and this may affect the recovery of microbial community. For example, in Discussion (line 25, p. 15262, and following ones) the authors reported that the ammonium increased immediately after fire (data not shown), whereas data set included in this study showed a decrease.

In addition, to evaluate "the joint effects of both drought and fire" (as authors affirmed at line 16, p. 15255) experimental design must include unburned plots for each rainfall treatment. By contrast, only for experimental condition "without rainfall manipulation" an unburned control was included. The reduction in soil water content and in most biological parameters observed with increase of drought in burned area is expected and obvious, and could be not due to fire. Indeed, the experimental design used in this study does not allow to know if reduction of these parameters was due only to drought or also to fire. In this paper there are two data set that should be not discussed together, one concerning fire effects (EC- vs EC+), another drought effects (EC+, HC+, MD+, SD+) on soil microbial and chemical properties.

Detailed comments:

1) Lines 17-18, p. 15252: the sentence is not true for K, because this decreased in burned plots (see Fig. 2a and lines 7-8, p. 15260). 2) Lines 21-22, p. 15252 and lines 21-23, p. 15261: actinomycetes did not decrease in burned soil compared to unburned soil (see Table 2). 3) Lines 4-9, p. 15256: fresh soil must be used only for measurements of ammonium and nitrate, whereas air-dried soil must be used to determine exchangeable potassium, phosphate and soil organic matter. 4) Lines 23-26, p. 15261: the sentence is not completely true, because fungi and fungi/bacteria

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ratio were significantly reduced by MD+ and SD+ treatments only in 2011, whereas, bacteria, Gram+ and actinomycetes were significantly affected only by SD+ treatment and only in 2011 (see Table 2). 5) The title of paragraph 4.2 “Effect of fire under manipulated rainfall patterns” is not suitable: data did not allow to know the fire effect because experimental design did not include unburned plots for each rainfall treatment.

Interactive comment on Biogeosciences Discuss., 11, 15251, 2014.