

## ***Interactive comment on “Knowledge needs, available actions and future challenges in agricultural soils” by G. Key et al.***

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Overall, the authors have identified an interesting topic, and have appropriately highlighted some of the current agricultural challenges, which deserve further investigation. The topic is important and relevant for increasing understanding regarding the goals of conservation agriculture and the efficiency of its methods.

Specifically, the authors mentioned the beneficial role of 'the use of a mixture of organic and inorganic soil amendments'. Indeed, integrated nutrient management encompasses an important part of integrated farming systems, which have been proven to sustain soil health. Yet, among the topics discussed in this paper, it seems that the topic of integrated farming systems deserves more investigation. On the one hand, over the last few years there is an increasing awareness of integrated and moderate-

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intensity agricultural systems, and of their beneficial role in sustaining soil functions and ecosystem services. On the other hand, there is still a lot more to be discovered regarding these effects. Of particular interest in this regard is livestock grazing of crop stubble in mixed agro-pastoral systems, whose intensity was identified by the authors as a factor that has to be reduced. Yet, recent studies show that moderate stocking rates have improved soil quality and functioning over the long term. At the same time, it is clear that the topics included (or excluded) in this paper were determined by the very specific methodology utilized by the authors (as detailed in the methods section). It is therefore suggested that the authors should highlight this topic among the ones which deserve more research in the future.

Regardless, some modifications are recommended in order to make the paper clearer. For example, the term 'action' for describing agricultural practices is not so common. I'd recommend modifying this term to 'practice' throughout the paper. Similarly, I'd suggest the authors use acceptable and professional terms such as integrated nutrient management (instead of 'a mixture of organic and inorganic soil amendments'); cover cropping (instead of 'grow cover crops when the field is empty'); intercropping (instead of 'growth of crops between crop rows'); manuring and composting (instead of 'amend the soil with manures and agricultural composts'); mulching (instead of 'add mulch to crops'); and best management practices (BMPs) or recommended management practices (RMPs) (instead of 'best available techniques'). The authors may find several documentations of these professional terms, either in the Web of Science database or open sources.

In the abstract, it is not so clear what the seven beneficial practices are. I'd suggest numbering them to increase clarity (i.e., 'These included the use of (1) a mixture of organic and inorganic soil amendments [which should be replaced with 'integrated nutrient management']; (2) cover crops; (3) crop rotations; (4) the growth of crops between crop rows [which should be replaced with 'intercropping'] or underneath the main crop; (5) the use of formulated chemical compounds (such as nitrification inhibitors); (6) the

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control of traffic and traffic timing; and (7) reducing grazing intensity').

In the beginning of the methods section, the authors are asked to provide some more information about the major threats to soil health they have identified. In the current version, the list seems to be very partial.

The results section is sufficiently informative.

In the discussion section, some modifications are needed regarding the use of inaccurate terms, such as 'cover crops between crop rows' (should be intercropping) and 'soil loss' (should be soil erosion). Apart from that, the bimodal (positive and negative) effects which define the 'trade-off category' further highlight the important role of integrated agricultural systems, which combine both conventional and conservation practices in order to decrease environmental footprint while sustaining crop yields productivity. Regardless, similar to integrated nutrient management, the practicing of integrated agricultural systems also includes the concept of integrated pest management (IPM). Among other missing topics in this study, the neglecting of this concept highlights the paper's limitations. I'd recommend the authors to specify this topic in the study's major limitations (the last paragraph of the discussion section).

Usually, no citations are allowed in the conclusions sections. The authors are asked to go through the journal instructions and check on this point.

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