

Effect of market gardening practices on soil biological activity in Bobo-Dioulasso (Burkina Faso)



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Introduction

In Burkina Faso, market gardening practices are characterized by intensive use of mineral fertilizers and chemical pesticides with potentially negative environmental consequences, but also by regular and large inputs of organic amendments that can contribute to soil quality improvement (Predotova *et al.*, 2010; Son *et al.*, 2017). However, there is little information on the impact of these practices on soil biological activity, which is a major indicator of soil quality.

The purpose of this study was to evaluate the effect of the duration of cultivation on soil biological activity indicators in gardening plots.

Methodology

- Study site: Kuinima market garden in Bobo-Dioulasso (Burkina-Faso)
- Ferrallitic soil
- 69 gardens selected on the basis of the duration of cultivation (fig. 2)
- Plot history survey
- Soil sampling over 0-15 cm depth
- Soil analyses:
 - enzymatic activities, microbial biomass, basal respiration
 - organic carbon fractionation (stable and labile)

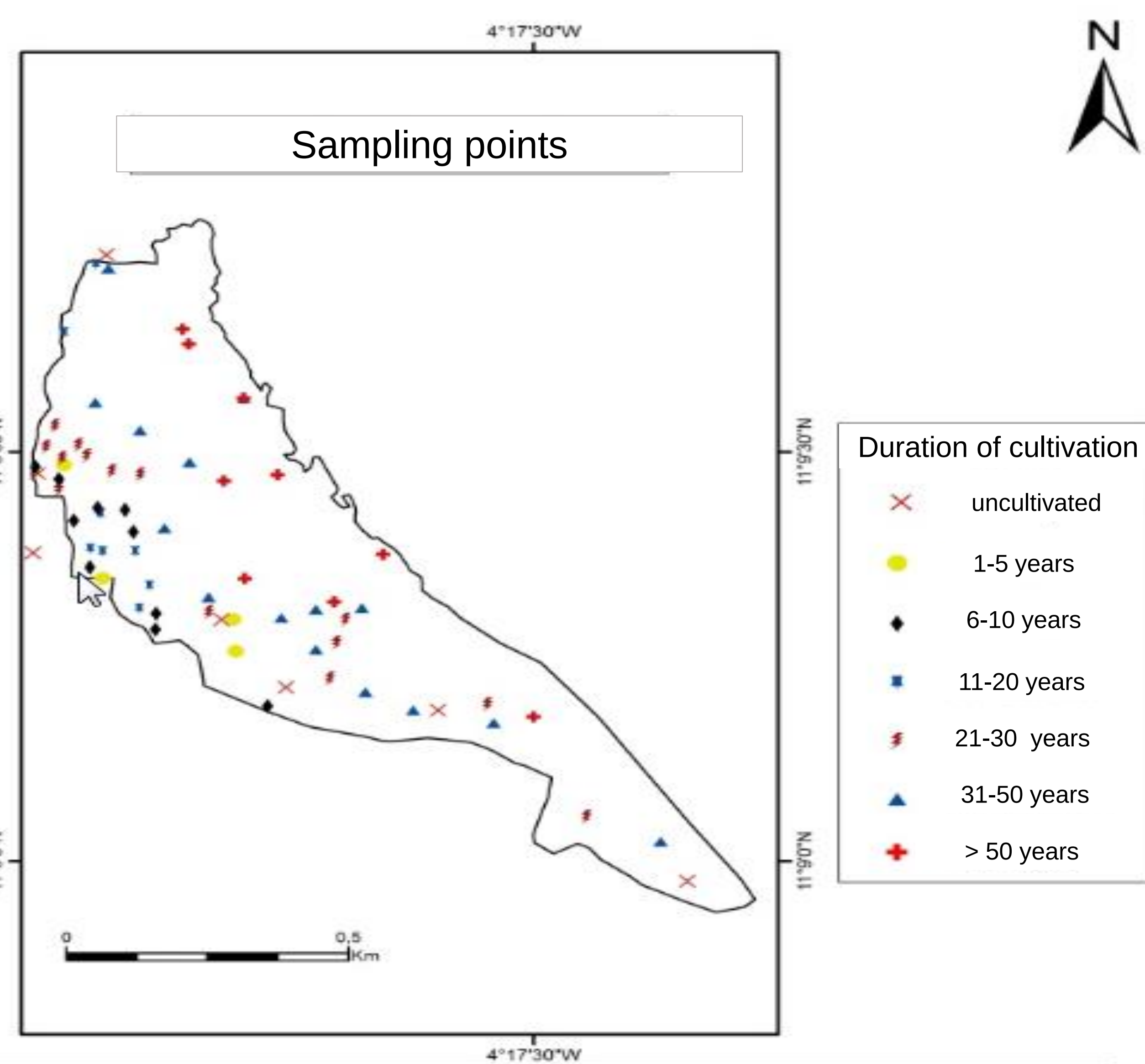


Figure 2: Location of the 69 gardens where soil samples were taken.

Conclusion

The beneficial effects of market gardening practices on soil biological activity appear to outweigh possible negative effects. This could result from the increase in organic carbon content (especially labile C) resulting from the inputs of organic amendments.

Results

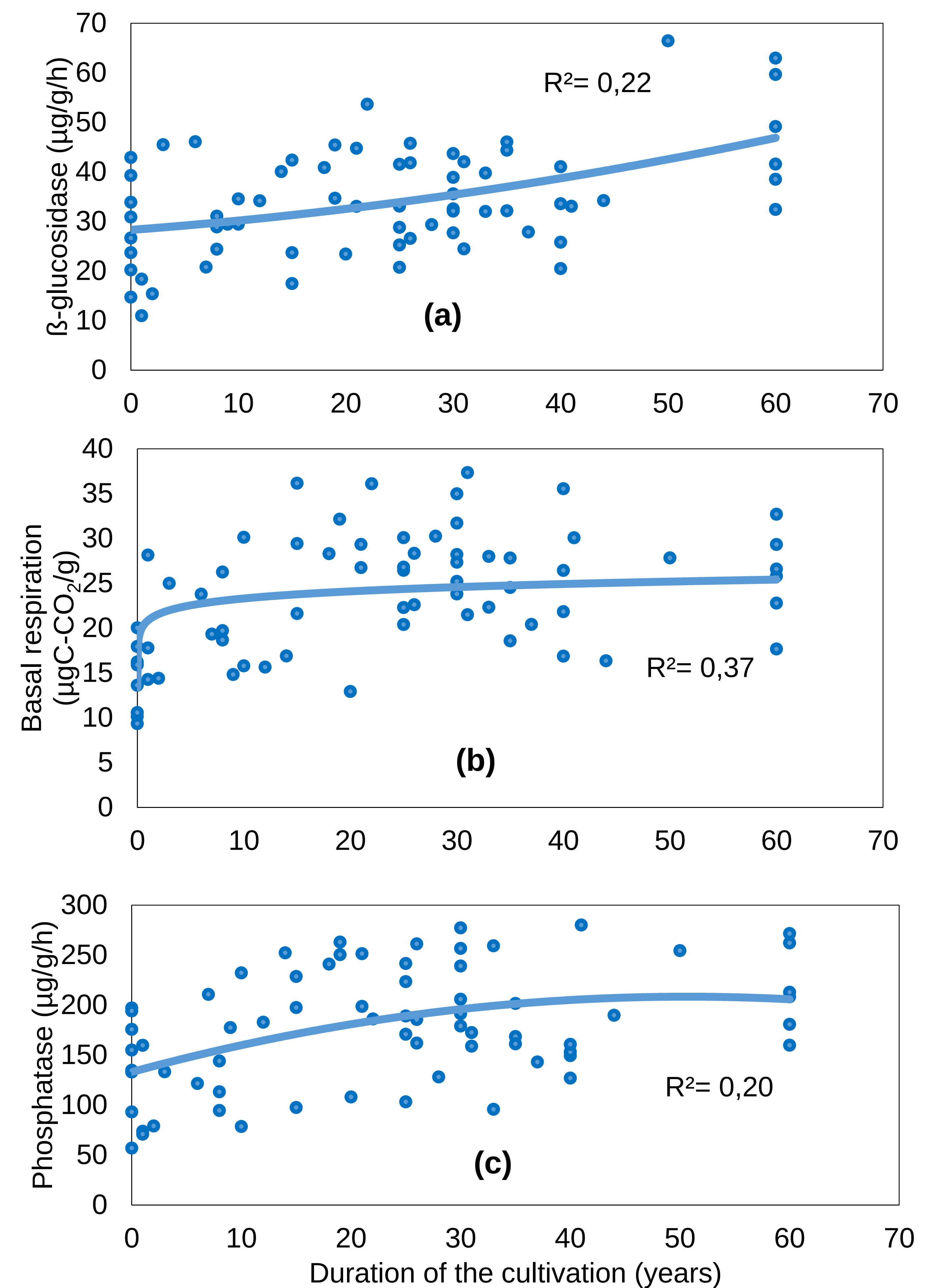


Figure 3: evolution of indicators of biological activity as a function of the duration of cultivation

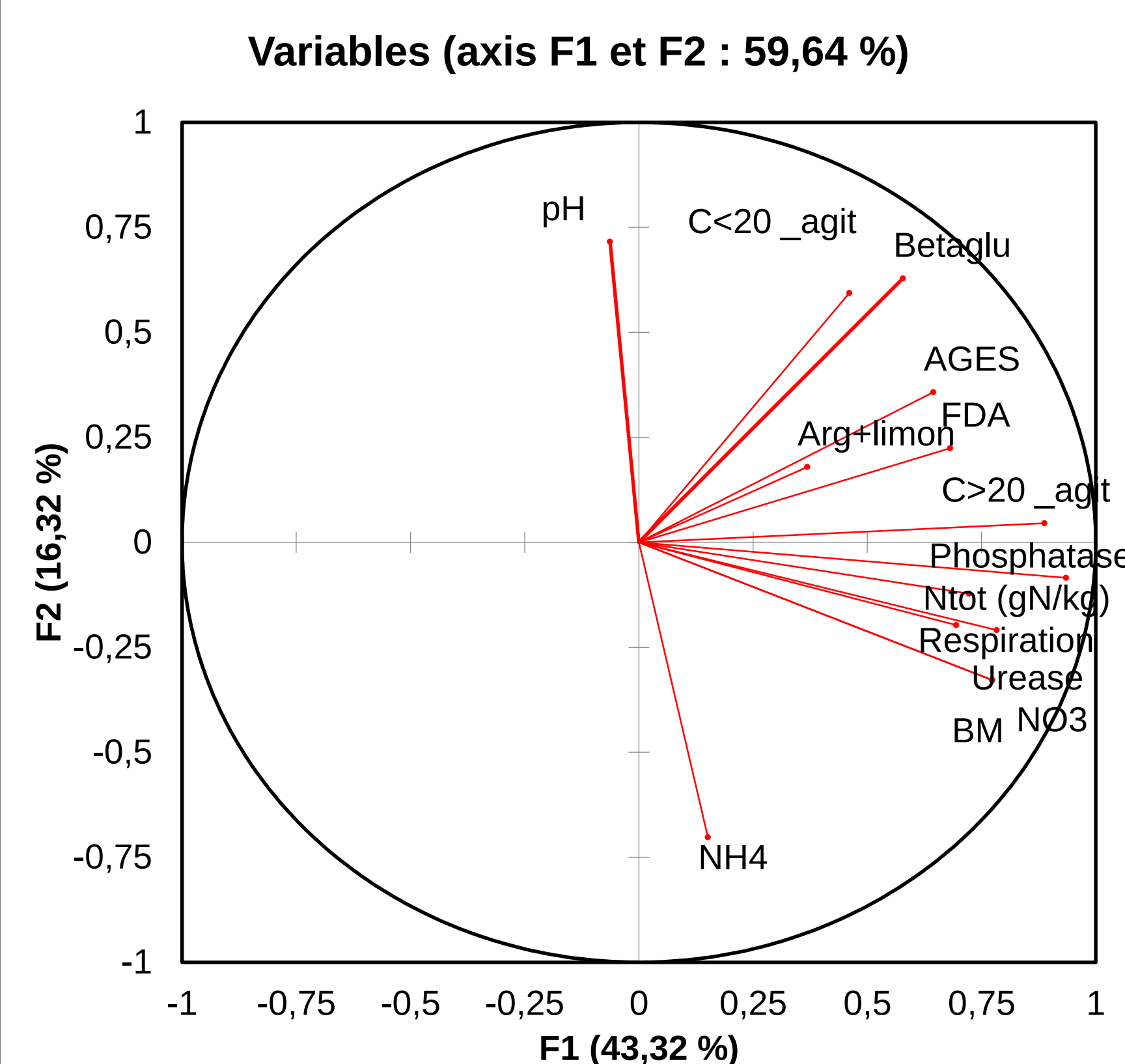


Figure 4: Graphical representation of axis 1 and 2 variables resulting from principal component analysis (PCA)

- ❖ Continuous increase in betaglucosidase over time (fig.3, a)
- ❖ Asymptotic increase in basal respiration and phosphatase over time (fig. 3b and c)
- ❖ Positive relationship between soil biological indicators and fraction of labile C (C>20) (fig. 4)

References

- Predotova, M., Gebauer, J., Diogo, R. V. C., Schlecht, E., Buerkert, A., 2010. Gaseous nitrogen and carbon emissions from urban gardens in Niamey, Niger. *Field Crops Res.* 115: 1 – 8.
- Son D., Somda I., Legreve A., Schiffers B., 2017. Pratiques phytosanitaires des producteurs de tomates du Burkina Faso et risques pour la santé et l'environnement. *Cah. Agric.* 26: 25005