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## Abstract

Conservation agriculture (CA) presents several advantages in agronomic, environmental and socio-economic terms. It is an important approach to address declining soil fertility and the adverse effects of climate change. The aim of this work was the comparison and evaluation of the impact of four cultivation techniques (no-till, minimum till, chisel and disc plow) on production of bread wheat and rapeseed. A field experiments was conducted in Saïs region at the experimental station of Douyet of the National Institute of Agronomic Research of Meknes, Morocco during 2019-2020 cropping season. The experiment design was a Split-plot with three replications. The results showed that the conservation agriculture has a positive effect than conventional agriculture. The highest grain yields were obtained with no-till, especially for rapeseed. On the other hand, the conventional tillage showed the highest yield for bread wheat compared with other cultural practices (chisel, minimum till and no-till) which had shown a similar yield.

Keywords: Conservation agricultural, *Triticum aestivum*, *Brassica napus*, yield.

## Introduction

Morocco is severely affected by climate variability; the projections suggest that 2050 aridification undergoes a further increase in temperature of +1.5 °C (+2 °C) and a decrease in rainfall of about -15% (Woillez, 2019). In the context of climate change, conservation agriculture (CA) played an essential role in contributing to food supply; indeed, increased soil moisture helps increase drought resistance and reduces risks of crop failure. The conservation agriculture shown positive effect on wheat production under dry Mediterranean climate (Mrabet, 2002; Bendidi, 2006; Kassam et al., 2012).

## Materials and methods

The study was the comparison and evaluation of the impact of four cultivation techniques (no-till, minimum till, chisel and disc plow) under climate change conditions on production of bread wheat and rapeseed. The experimental design is a Split-plot with three replicates. Crops (bread wheat and rapeseed) were attributed to the large plots and the tillage sequences were assigned to the sub-plots. Four tillage treatments have been tested (no-till [NT], minimum till [MT], chisel [CP] and disc plow [DP]). Samples of above-ground biomass of whole plants were collected at harvest. Then the dried samples were weighed to determine grain yield. A random meter squares were taken in each plot, on the four modes of work, while avoiding the border effect. The year of the trial (2019-2020) was very dry, he has recorded 135 mm of rainfall in Douyet.

## Results and discussion

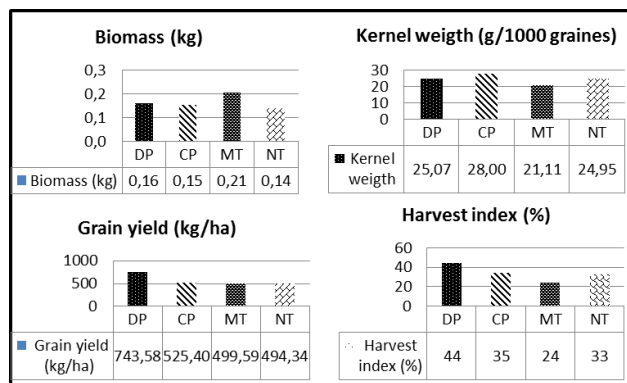


Figure 1. Effect of practices cultural on wheat yield components

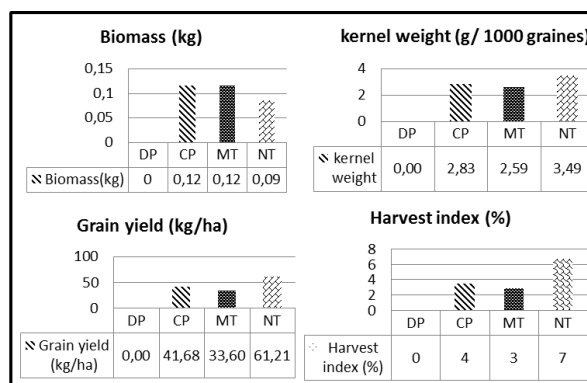


Figure 2. Effect of no-till on rapeseed yield components

- The analysis of variance on the calculated on wheat yield components indicates no significant difference between the practices cultural. Figure (1) shows that dry matter and kernel weight of no-till is lower than the conventional tillage. The conventional tillage showed the highest yield and harvest index for bread wheat compared with other cultural practices (chisel, minimum till and no-till). This results is in agreement with the one of Dayou et al. (2017). Anken et al. (2006) show that crop yields at the transition period are generally lower than those obtained after tillage, but improve after about three years of no-till.
- The practices cultural effect tended to be greater but no significant difference indicated in rapeseed yield components. Figure (2) the no-till showed the lowest biomass compared to the chisel and minimum till, while it is observed that the disc plow recorded no biomass. Whereas, the non-germination was showed in deep plough due to the difficult climatic conditions. The rapeseed under no-till registered the highest kernel weight, grain yield and harvest index compared to other cultural techniques (chisel, minimum till and disc plow). This results is in according to Malhi et al. (2001) found that barley revealed the highest yield under no-till than under conventional tillage, probably due to moisture conservation under no-till. Other results indicate the advantage of no-till and minimum tillage over conventional tillage (Bendidi, 2006; Chenaffi et al., 2011).

## Conclusion

The crop systems showed no significant effect on the yield parameters of the two species studied. However, there was a positive effect for rapeseed. This technique the no-till seems to have the potential for significant gains in soil water status and crop yields. The contradictions in the results may be related to the poor conditions of the crop installation (very late sowing) and the climatic conditions (drought).

## References

- Anken, T., Stamp, P., Richner, W., Walther, U., Weisskopf, P and Rek, J., 2006. Nitrate leaching and soil structural properties under conventionally cultivated and no-till crops. In: Proc. 17th Conf. ISTRO, Kiel, Germany, pp. 1535-1540.
- Bendidi, A., 2006. Contribution to the study of the influence of tillage systems on the performance and behavior of wheat in the region of Saïs. Memory of the third cycle. National school of Agriculture, Meknes. 107p. French.
- Chenaffi, H., Hannachi, A., Touahria, O., Fellahi, Z.E.A., Makhlof, M. and Bouzerzour, H., 2011. Tillage and residue management effect on durum wheat [*Triticum turgidum* (L.) Thell.ssp. *turgidum* conv. *Durum* (Desf.) Mackey] growth and yield under semi-arid climate. Advances in Environmental Biology 5: 3231-3240.
- Dayou, E.D., Zokpodo, K.L.B., Glièlè Kakai, A.L.R. and Ganglo, C.J., 2017. Impacts of the conventional tillage tools and reduced tillage on the soil fertility preservation: critical review.
- Kassam, A., Friedrich, T., Derpsch, R., Lahmar, R., Mrabet, R., Basch, G., González-Sánchez, E.J. and Serraj, R., 2012. Conservation agriculture in the dry Mediterranean climate. , 132(none), 7-17. doi:10.1016/j.jfcr.2012.02.023.
- Malhi, S.S., Grant, C.A., Johnston, A.M and Gill, K.S., 2001. Nitrogen fertilization management for no-till cereal production in the Canadian Great Plains: a review. Soil and Tillage Research, 60(3-4), 101-122. doi:10.1016/S0167-1987(01)00176-3.
- Mrabet, R., 2002. Wheat yield and water use efficiency under contrasting residue and tillage management systems in a semiarid area of Morocco. Exp Agr 38:237-248.
- Woillez, M.N., 2019. Revue de littérature sur le changement climatique au Maroc : observations, projections impacts, Papiers de Recherche AFD, n° 2019-108, Juillet.