



Theme 3

Impacts of soil nutrient management on the environment and climate change



DYNAMICS OF SOIL NITRATES IN A PLOT UNDER ONION CULTIVATION IN THE SAISS BASIN

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INTRODUCTION

Morocco has always made the development of the agricultural sector a priority and a strategic choice. This sector, which is one of the main levers of economic development, is faced with the challenge of the intensive use of nitrogen fertilizers which threaten the quality of agricultural soils. This intensification causes the leaching of nitrates through the soil into groundwater. The objective of this study is to follow the variation and the path of nitrates of agricultural origin in the soil on the Douiyet experimental estate by considering a plot under onion cultivation.

Methodology

A nitrogen fertilization trial was carried out in the "Douiyet" experimental station of the Regional Center of Agronomic Research of Meknes (Fig.1). The experimental design adopted is Complete Random Blocks. The plot is divided into 3 blocks of 6 sub-plots having received 6 different doses of nitrogen (0, 90, 135, 180, 225 and 270Kg N/ha). Soil samples were taken randomly and periodically from each elementary plot at five depths (0-20cm, 20-40cm, 40-60cm, 60-80cm and 80-100cm).

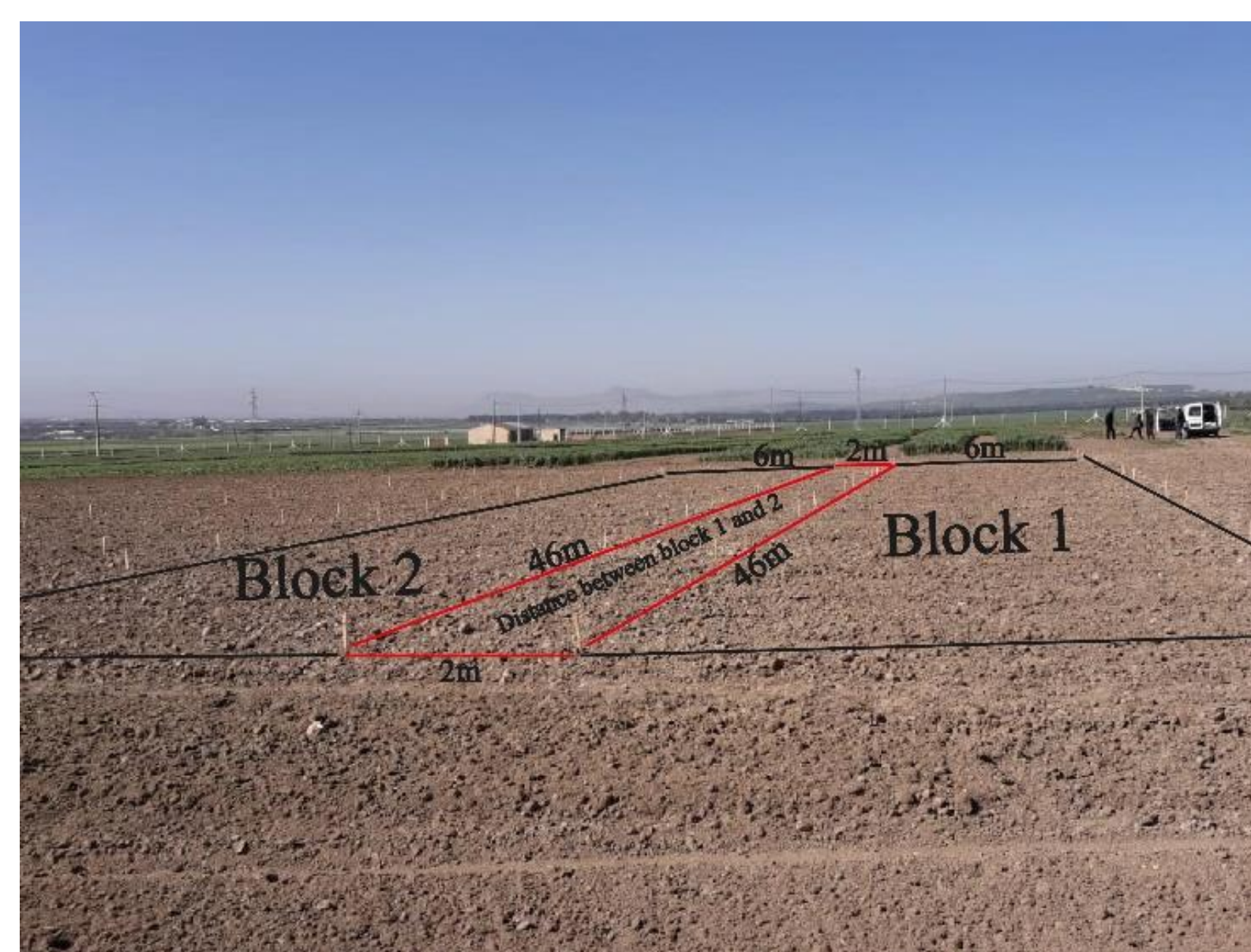


Fig. 1 : Experimental plot

RESULTS

The monitoring shows a direct impact of nitrogen spreading on nitrate concentrations on the first horizon 0-20cm and at all doses, but for other depths, the effect of spreading is not very visible, so we can see a rapid decline in nitrate concentrations beyond the bulb-forming stage on most doses, this is probably due to the onion's peak growth phase, and significant nitrogen uptake by the surface roots of the plant (Fig.3).

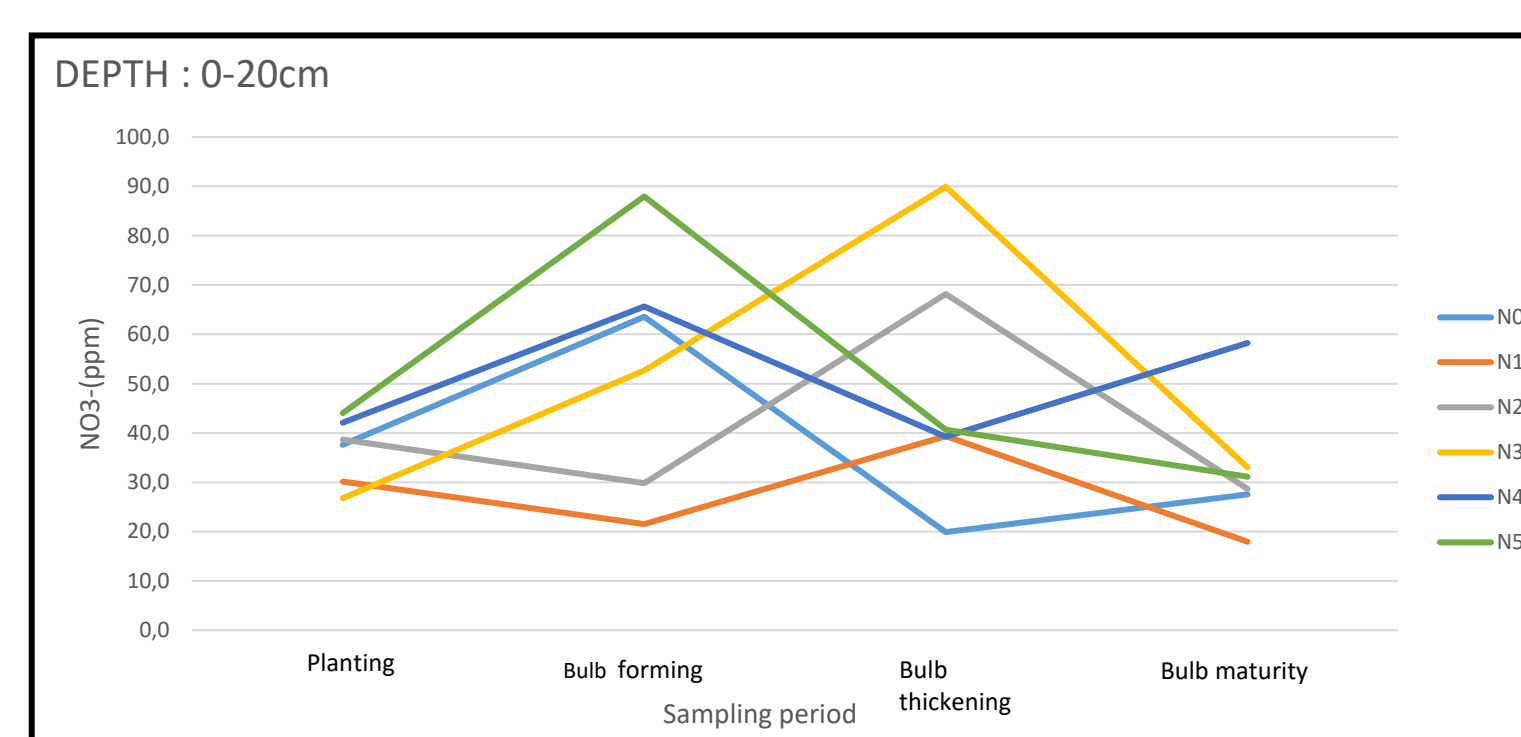


Fig. 1 : Nitrates concentrations variation

For the rest of the soil profile, the effect of the dose is little noticed or even absent, moreover, the nitrate levels gradually decrease over time regardless of the dose applied. In addition, it appears that the amount of nitrogen applied does not reflect the concentrations obtained in the soil. This can be explained by a preferential use of nitrogen on the first layers, due to the superficial rooting of the onion,

an immobilization of this element by the microorganisms and especially by the low leaching of (NO_3^-) towards the great depths. Regarding the yield, we note that it increases in proportion to the dose of nitrogen applied, with a slight fluctuation in the sub-plot under N_3 treatment (180 kgN/ha). The values obtained per sub-plot range between 39.72t/ha and 70.84t/ha (Fig.4). It can be deduced that the yield increases with the increase in the dose of nitrogen supplied.

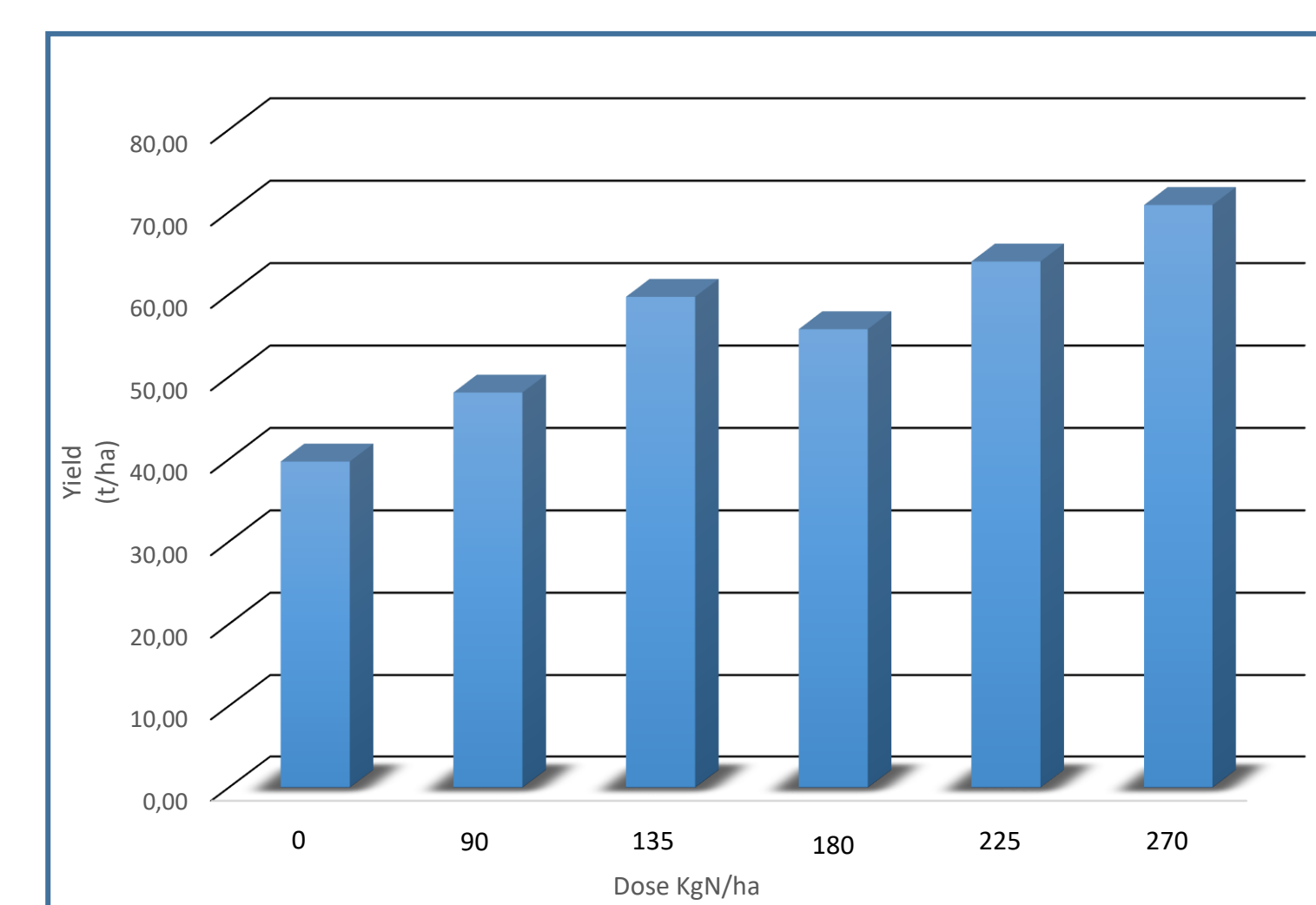


Fig. 3 : Average yields in t/ha for each subplot on 3 blocks

CONCLUSION

The main points to be drawn from this study are the significant effect of time as a function of the applied dose on the soil nitrate concentrations, but the doses seem to have a more significant effect on the yield than on nitrate concentrations in the soil. In fact, it is difficult to predict the path of nitrogen applied to the soil during the crop cycle since several factors control the nitrogen cycle in the soil.

Acknowledgements

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