Materials & Methods

Qualiagro site (Fig. 2).

- The soil is a loess-derived silt loam (topsoil: 787 g/kg silt, 152 g/kg clay).
- 40 plots with 3 composts, manure and a control at 2 levels of N.
- Amendments (~4 t/ha) are applied every other year.
- Topsoil OC ranges from 9.35 to 15.58 g/kg (2011), initially 10.5 g/kg.

Effect of EOM on irrigation

- Fig. 4 shows the simulated distribution of daily irrigation needs for CNT N\textsubscript{opt} in 2007.
- Appropriate N management (CNT N\textsubscript{opt}) kept OC near its original level, CNT N\textsubscript{opt} decreased it; EOM application increased OC for all treatments (Table 1).
- Results
  - Based on texture and OC, FC and WP were predicted (PTFs; Raes et al., 2003); resulting PAW increases with OC content (Table 1).
  - Simulating irrigation needs with BUDGET showed that increased PAW slightly decreased irrigation needs.

Results & Discussion

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Conclusions

- 3 composts and a manure increased OC at different rates; a control with sufficient N kept OC near its original level from 1998.
- GSW and BIO decompose slowly, their effect on OC is long-lasting; stable MSW contained more labile components, its effect was sooner detectable but smaller.
- According to predictions (PTFs), all treatments increased PAW (OC-dependent) and hence reduced BUDGET-simulated irrigation needs.
- Irrigation needs were larger in 2008 (597 mm precipitation: average year) than in 2007 (777 mm precipitation: wet year).
- An OC-depleted, denser soil may restrict root growth and require more irrigation.
- On average ~4 mm of water can be saved comparing CNT N\textsubscript{opt} to GWS N\textsubscript{opt} (Table 1), this corresponds to 4 l/m² (Fig. 6) or 40,000 l/ha.
- Further increasing OC (GWS) could decrease irrigation needs by ~13 mm; Foley & Cooperband (2002) observed decreases of 7.34 mm for compost-amended soils.

Perspectives

- Actual measurements of the water retention curve of the respective treatments will be made to determine OC-induced changes in WHC and PAW.
- Quantification of the ‘non-nitrogen’ yield benefit of the different composts.
- Possible determination of leaf water potential as a potentially better indicator of the effect of compost on soil and plant (Marno et al., 2000).

References