

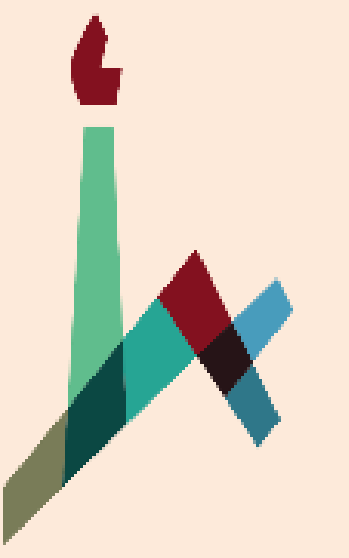


# Following The Mobile Resistome Through The Path Of Reclaimed Wastewater: From Treatment Plants To Irrigated Crops

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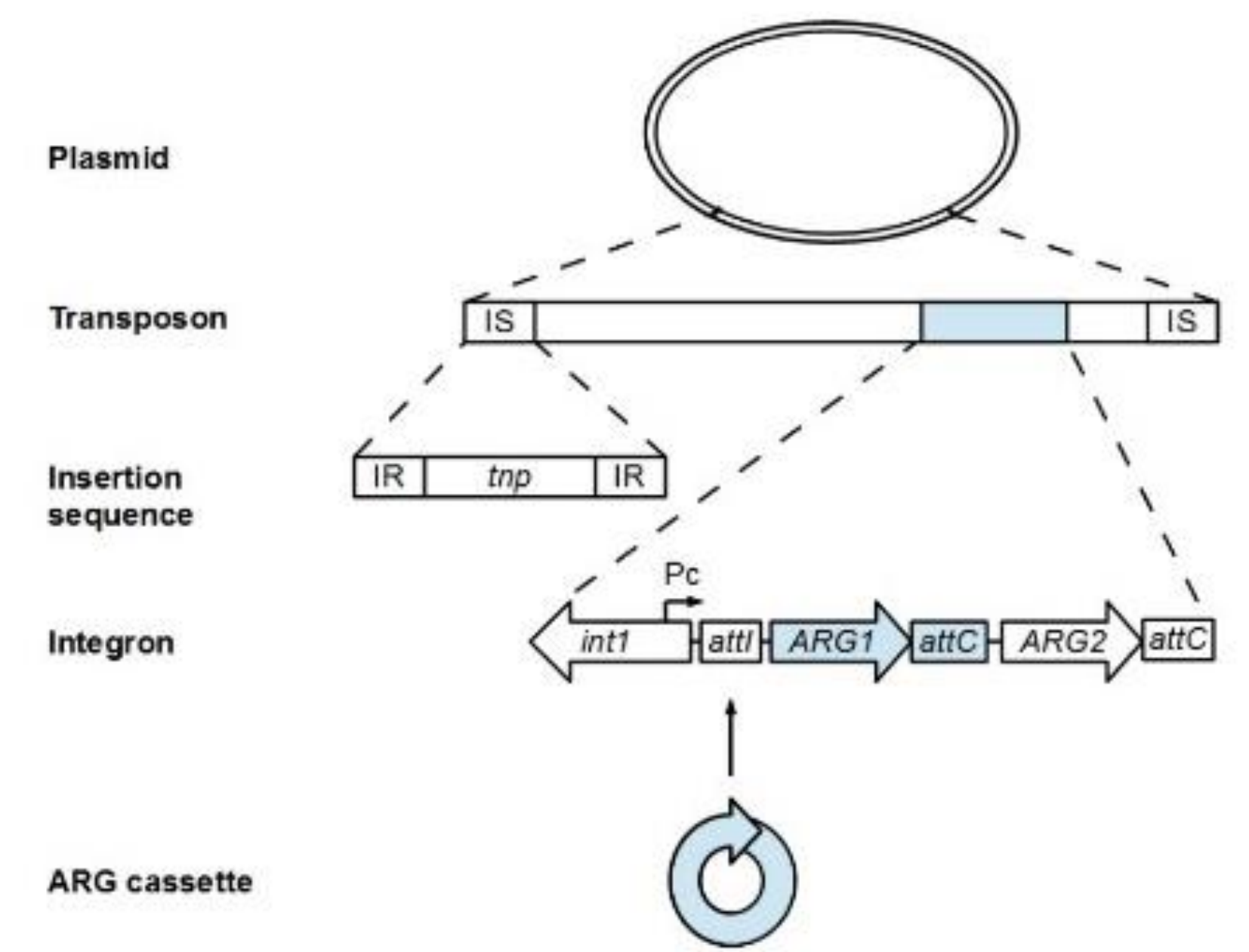
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## The Scenario

Urban wastewater reuse is a viable solution for sustainable agriculture in arid and semi-arid geographic areas. However, this practice poses open questions regarding potential epidemiological risks including the discharge of antibiotic resistance genes and bacteria (ARG, ARB). In particular, plasmid- and integron-associated antibiotic resistance genes (PI-ARG) can significantly contribute to the ultimate spreading of ARG.



## Approach used

The aim of this study was to track the mobile resistome along a treated wastewater irrigation continuum. Absolute and relative abundance of a suite of eight microbial genes (*16S rRNA*, *int1*, *qnrS*, *bla<sub>TEM</sub>*, *bla<sub>CTXM-32</sub>*, *bla<sub>OXA2</sub>*, *bla<sub>OXA10</sub>*, and *bla<sub>GES</sub>*) were analysed by means of qPCR across three wastewater treatment stages, in four Israeli WWTPs and in model and real-scale receiving fields.



Treated Wastewater



Irrigated fields

## Receiving environments

### Full scale fields

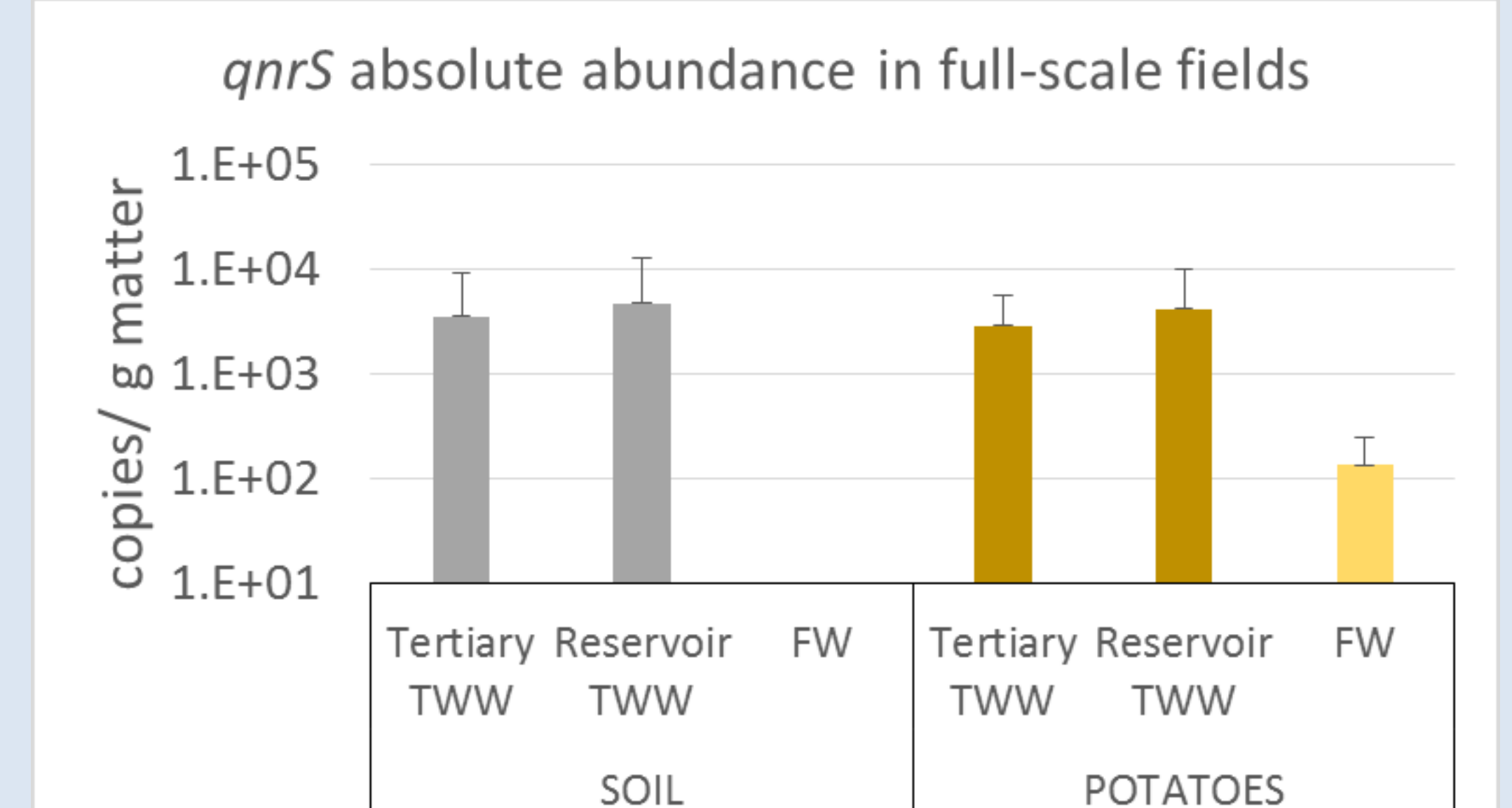
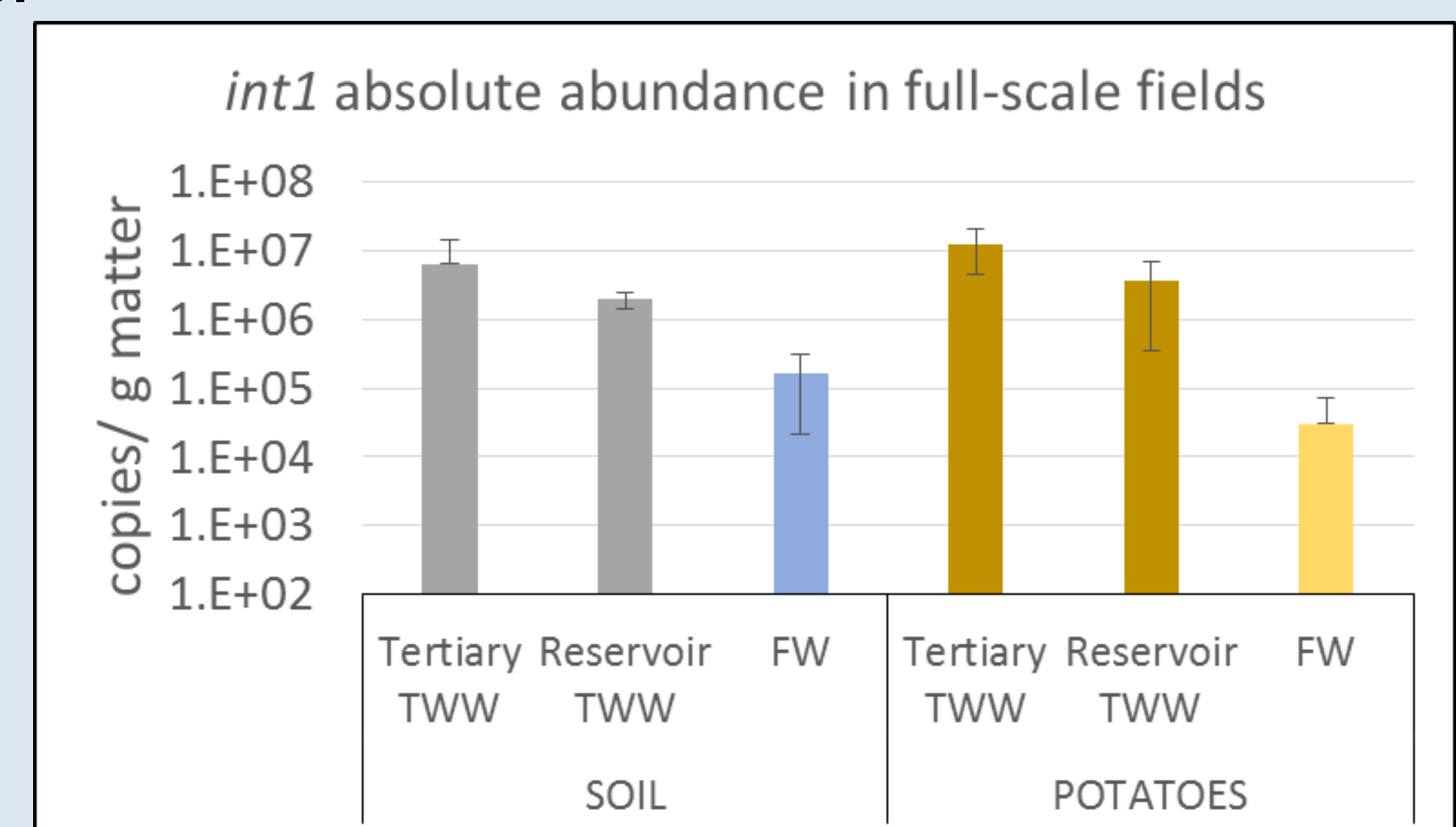


### Lysimeters

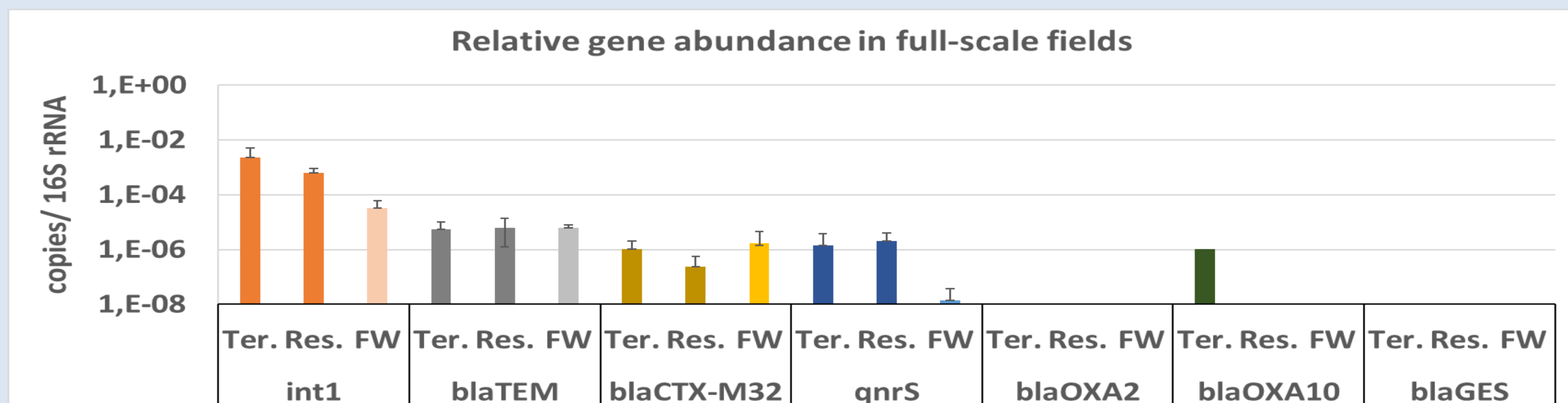


## Results

Low abundance of the surveyed antibiotic resistance genes was detected on the outer surface of TWW irrigated crops and the related soils. In contrast, significant levels of class 1 integron (*int1*) and *qnrS* genes were detected both in TWW irrigated soils and crops.



## Relative gene abundance in full-scale fields



## Conclusions

Although reclaimed treated wastewater is a source of ARG that are eventually introduced to irrigated soils, an enrichment for these over time does not seem to be a common trend, addressing ecology as an important driver of ARG propagation. On the other hand, class1 integrons (*int1*) and quinolone resistance plasmids (*qnrS*) were clearly enriched, suggesting that the mobile resistome still poses a potential risk in antibiotic resistance spreading within the framework of water reuse.



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