



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

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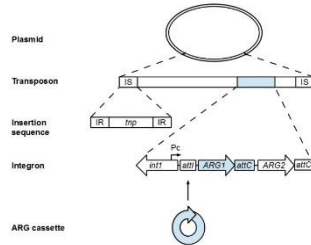
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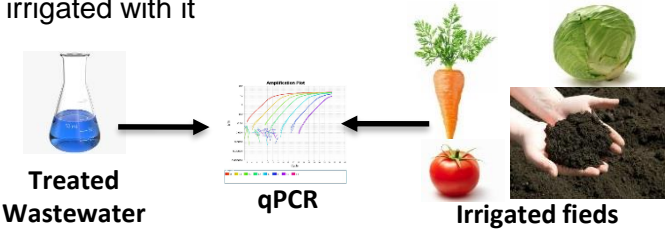
The Scenario

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 to anthropogenic.



Approach used

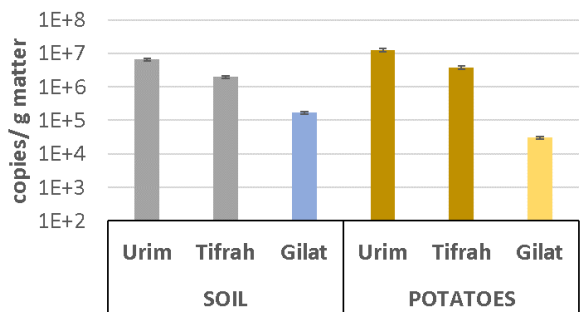
The absolute and relative abundance of a pattern of six microbial genes (*16S rRNA*, *int1*, *qnrS*, *bla_{TEM}* and *bla_{CTXM-32}*) were analysed by means of qPCR throughout three UW treatment stages, in four Israeli WWTPs and in receiving soil/crops irrigated with it



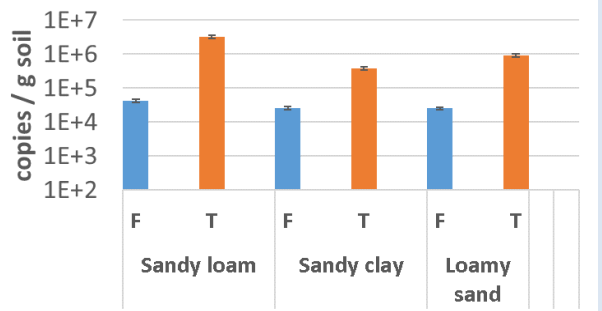
Results

The patterns of abundance of the surveyed genes revealed different trends of ARG content in water sampled, however, 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 values of integron integrase1 (*int1* gene) were detected both in TWW irrigated soils and crops.

int1 relative abundance in full-scale fields



int1 abundance in soil



Downstream environments

Full scale fields



"Model fields"



Full scale agricultural fields, as well as model lysimeters, irrigated with reclaimed wastewater or fresh water were sampled over a three months span.

Conclusions

Despite reclaimed treated wastewater contains ARG that are eventually introduced to the receiving agricultural environments, an enrichment for these over time does not seem to occur, in concordance with previous studies. On the other hand, class1 integrons are clearly enriched in soils and crops in the described conditions and could still contribute to widen the horizontal gene transfer potential within TWW-irrigated soil-communities.

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