The influence of hydrochemistry on the distribution of pathogenic strains of *Escherichia coli* in urban groundwater of Yaoundé

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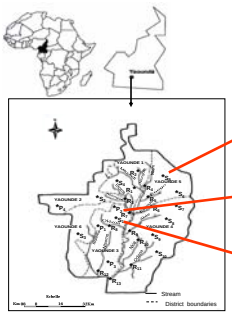
Introduction

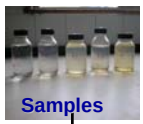
Natural waters contaminated with fecal material are potential sources of pathogenic bacteria and other disease agents for people in developing countries, especially in Yaoundé (Cameroon). Basically, the main sources of water in this city include surface water, ground water and treated domestic water. Due of population increase and inadequacy of public distributed networks in urban areas, access to safe drinking water is of services concerns. The limited coverage of the piped water network obliges many people to recourse from natural water to satisfy their needs, without real concern for their bacteriological quality. Distribution of bacteria in groundwater is influenced by its physico-chemical characteristics (Nola et *al*., 2002). This study aims to assess the importance of certain physico-chemical variables on the distribution of pathogenic strains of *E. coli* in natural water in the city of Yaoundé.

Material & Methods



Location of sampling sites (R: Streams water points, S: Springs water points, P: Wells water points).

Samples were taken from 26 sampling points and analyzed for physico-chemical and bacteriological contamination with the techniques described by Rodier (1996) and APHA (1998) respectively.



Filtration

44°C, 18 - 24h

Surface spread
22-28°C, 5-7 days

Seeding on PCA
37°C, 18 - 24h

Classic gallery

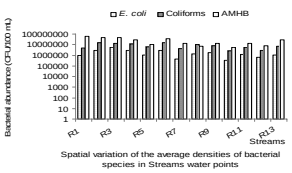
Bacteriological analysis techniques

Results & Discussion

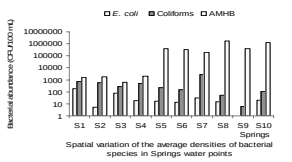
Maximum and minimum values of the physico-chemical components in the various water systems.

Type of water	pH (uc)	Conductivity (µS/cm)	SS (mg/l)
streams	5,31 - 9,5	28 - 564	1 - 506
Springs	4,00 - 6,43	35 - 201	0 - 22
wells	4,83 - 6,78	82 - 478	0 - 24

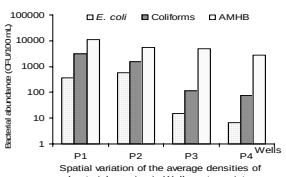
The nature of the land crossed, especially when waters are not subject to human activities explains acidic or basic nature and the low mineralization of different water points (Rodier, 1996). The acidic nature of groundwater in the city of Yaoundé, which has already been noted by Nola et *al*., (2002), would also be linked to the nature of the acidic rock which is the natural substratum of the Yaoundé region (Yongue-Fouateu, 1986).



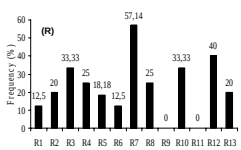
The high abundances of bacteria recorded in the streams water points are probably related to an abundant source of mixed pollution.

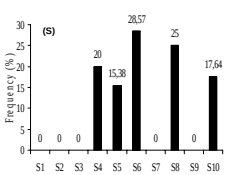


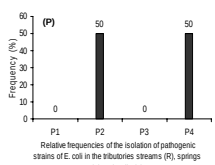
The bacteriological quality of springs water points follows a spatial and a temporal variation which should be related to differences in human population density.



The bacteriological quality of wells water points follows a spatial variation which should be linked to the variability of potential retention of micro-organism with the soil.







The presence of potential pathogenic strains of *E. coli* in the water points would be due to a mixed source of pollution. Similarly, the quality of water analyzed depends on the level of development, maintenance of water points and climatic conditions.

Corrélation Test

- Pathogenics *E. coli* and pH (P< 0.05)
- Nature of rejected substrat (Pelmont, 1996)
- Pathogenics *E. coli* and electrical conductivity (P<0.01)
- Mineralization activity (Nola et *al*., 2002)

The variations of the pH affect significantly (P <0.05) the dynamics of abundance of *E. coli* and pathogenic *E. coli* in a few sites. This should be, according to Pelmont (1996), due to the nature of substrates discharged into the receiving environment and that would be necessary to the physical integrity of the various constituents of the microorganisms.

The degree of mineralization of the water significantly influences (P <0.01) the distribution of pathogenic *E. coli* in the waters of the station R7. According to Fujikawa et *al*., (1992), the increase in salt concentration in a medium at times can also minimize the inhibition by irradiation of bacterial strains such as *Escherichia coli*.

Conclusion

The increase of the pH and dissolved oxygen in aquatic environment of Yaoundé promotes the development of pathogenic strains of *E. coli*. However, high level of electrical conductivity reduce the density of these bacteria.

References

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Acknowledgements

We greatly thank Pr C. F. Bilong Bilong, Dr G. Ajeagah and Mr P.R. Fotsing Kwetche, all from the Laboratory of General Biology, Faculty of Science for their assistance in the preparation of the manuscript.