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Contribution to the clarification of surface water from the *Moringa oleifera*: Case M'Poko River to Bangui, Central African Republic

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ABSTRACT

Moringa seeds can be effective in the treatment of water because they contain a cationic electrolyte. They can then replace the sulfate of alumina or other flocculants. In this study, we opted for the clarification of surface water from the river M'Poko using seeds of *Moringa oleifera* dried and transformed into powder. In the literature, we can find very different quantities of seeds used. We have used a method of experimental design to optimize the treatment of our samples of raw water with the seeds of Moringa. The experimental design used is a full factorial design that determines the importance of various factors and also the relationship between these factors so as to identify the best conditions to meet the target set by this study, which is to clarify a maximum quantity of raw water from the river. Another problem, met in the use of Moringa, is the important contribution of organic matter in the water treated by this natural coagulant. To avoid a bacterial proliferation, in time, in the water so treated, we used sand/coal filtration, which proved to be very effective. The water, treated by Moringa and filtered, possesses turbidity and a quantity of organic matter corresponding to the required standards. Such water can thus, be disinfected by chlorination for human consumption.

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Keywords: *Moringa oleifera*; Clarification; Experimental design; Optimization; Filtration; Coagulation; Developing country

1. Introduction

The presence of undesirable organic or mineral substances causes some problems in obtaining drinking water. These substances are in colloid systems which are stable due to the presence of surface charges and, therefore, surface forces and remove any possibility of elimination by natural setting (Gregory, 1977; Masschelein, 1996). With a population that is growing very fast and in a context of lawlessness, the city of Bangui, capital of the Central African Republic, is experiencing more and more problems relating to drinking water. Indeed, the situation of water supply in urban and semi-urban areas is very precarious. In Bangui the supply rate is only 28%.

However, 72% of the population makes use of other sources of water (traditional wells, rainwater, rivers) which are not clean enough for consumption. Historically, the first coagulants were mineral or vegetable (Gregory and Duan, 2001; Li and Gregory, 1991; Dentel and Gosset, 1987; Jahn, 1999), but the lack of scientific knowledge of their mechanisms of action has led to their replacement by chemicals. Consequently, in some cases, the addition of mineral salts is used and causes the agglomeration of particle that can be removed by decantation or filtration (Alaert and Van Haute, 1981).

However, today we need to improve the water quality, because such vegetable coagulants are probably best suited to water treatment in developing countries (Jahn, 1984; Diaz

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