



Use of *Moringa Oleifera* Seed Powder as Water Purifier: A Sustainable Approach for Rural Development.

KEYWORDS

Natural coagulant *Moringa oleifera* seed powder, rural populations, unsafe drinking water sources, coagulating and purifying efficacy.

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ABSTRACT A lack of economic power for minimum standards of living among the poverty stricken people of the rural communities and the quest for survivability makes them rely on natural resources and utilize them in all aspects of their life. For Rural Development Programme usage of *Moringa oleifera* tree to solve a lot of problems concerning nutrition, health and general well being is increasing. *Moringa oleifera* seed powder helps to control water borne diseases which spread through drinking water from open water reservoirs. Researchers have worked on *Moringa oleifera* and provided evidence on its multiple uses. In the present work we show that it acts as powerful coagulant as well as purifier and make water safe for drinking to rural people. Establishing potential of *Moringa oleifera* as water purifier, we are trying to prove its sustainability in the rural areas, addressing major issues like water quality and health. This increases the awareness of the inherent benefits of *Moringa oleifera* plant.

Introduction

Water is the unique molecule that preserves the life on the Earth. All life forms on the Earth depend on water. About 70% of Earth is covered with water in that 97% part is of Oceans. Only a small percentage of the total water is fresh water, which is used by humans for drinking, farming and washing. Safe drinking water is a major requirement of any society. Ensuring people's access to safe drinking-water and adequate sanitation will improve the quality of life of millions of individuals. Ground open well water is an important source of drinking water in rural areas. People in rural areas living in extreme poverty use unimproved drinking water sources as such as unprotected wells. These water sources become highly turbid in late summer and rainy seasons. Use of such turbid, untreated and polluted water passes water borne diseases through drinking to these population.

Effectiveness of ground open well water treatment depends on sedimentation of suspended particles and the removal of pathogenic microorganisms that spread water born diseases. There are several natural agents, mainly plants, reported for its coagulating activity and as well as removal of microorganisms.

Moringa oleifera seed powder is one of the best natural coagulant. Kalago et al. (2000) reported that crushed seeds are viable replacement of synthetic coagulant. Crapper et al., (1973); Miller et al., (1984); Martyn et al., (1989); Muyibi, (1994) reported that in Sudan it is believed that alum causes gastrointestinal disturbances and Alheimer disease, therefore Sudanese rural women traditionally use crushed *Moringa* seeds to clear the highly turbid Nile water instead of alum. *Moringa* seeds effectiveness against turbid water and same coagulation effects when compared with alum were reported by Muyibi and Evison (1995). Muyibi and Evison, (1995) reported that *Moringa oleifera* seeds could reduce turbidity up to 99%. Seeds also have softening properties in addition to alkalinity reduction as well as exhibiting a natural buffering capacity, which could handle moderately to highly alkaline surface and ground water. Obioma and Adikwu (1997) reported that *Moringa*

seeds can be used as an antiseptic to treat drinkable water. Olsen, (1987) and Madsen et al., (1987) stated that *Moringa oleifera* seeds possess antimicrobial properties. Seeds acts directly upon microorganisms present in unsafe drinking water and that results in their growth inhibition. The present study shows activity of *Moringa oleifera* seed as water purifier by killing the pathogenic microorganisms present in turbid drinking water.

Material and Methods

Study area: - Dombivli city. Ground water in open well near Umerli village.

Material used:- Seed powder of *Moringa oleifera*, turbid open well water sample from above site. Dried drumsticks were collected. Fine powder of seeds was prepared by using grinder, sieved and this powder was directly used for experimentation.

Doses of seed powder i.e. 50, 100 and 150 mg/l were selected for treatment, (Mangle et al., 2012). Seed powder solutions at concentrations 50mg/l, 100mg/l, 150mg/l using turbid well water samples were prepared separately in three conical flasks and kept on shaker for 45min at 110-120rpm for proper mixing. After removing from shaker the contents of the flask were allowed to settle for 24hrs. Growth of microbes from untreated and treated well water sample was studied using Spread plate technique. Nutrient agar medium was used. On each plate 0.1 ml sample was inoculated at the center of the plate and was spread with the glass spreader while rotating the plate. The plates were incubated at room temperature. Experiments were performed under aseptic condition. (Packialakshmi et al., 2014).

Observation



Fig.1 untreated water showing maximum no. of microbial colonies



Fig.2 Treated water with seed powder 50mg/l showing less no. of colonies than fig.1.



Fig.3 Treated water with seed powder 100mg/l showing lesser no. of microbial colonies than fig.1 and 2.

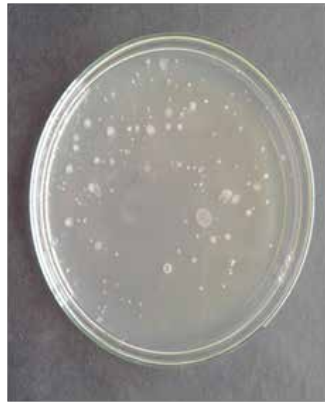


Fig.4 Treated water with seed powder 150mg/l showing least no. of microbial colonies than fig. 1, 2 and 3.

In present study, treatment of *Moringa oleifera* seed powder was given to ground open well water samples in different concentrations like 50mg/l, 100mg/l, 150mg/l to study its microbicidal activity. The total number of microbial (bacterial) colonies developed were counted in plates which were inoculated with untreated turbid water sample and water sample treated with different concentrations of *Moringa oleifera* seed powder. Observations showed that on plates inoculated with 0.1ml untreated water sample maximum number (682) of colonies were developed in fig.1. Seed powder treatment of 50mg/l showed development of less number (380) of microbe colonies in fig.2 than untreated water sample plates. The plates inoculated with water sample treated with 100mg/l developed less number (250) of colonies in fig.3 than former plates. The treatment with 150mg/l concentration showed development of least numbers (132) of microbial colonies in fig.4.

Result and Conclusion

Moringa oleifera is multipurpose tree. As per the observation it is clear that on the plates inoculated with water sample treated with 150mg/l concentration of *Moringa oleifera* seed powder developed least number (132) of microbial colonies showed in fig.4. and plates inoculated with untreated water sample develops maximum number (682) of microbial colonies in fig.1. So, we conclude that seed powder of *Moringa oleifera* has coagulation and antimicrobial property and has minimized many numbers of microorganisms presents in untreated water sample. Thus *Moringa oleifera* seeds has water clearing and purifying capacity. It functions as a natural coagulant as well as antimicrobial agent for the treatment of ground drinking water source. Seed powder can be used in the rural areas where no other facility is available for purification of drinking water. As it is natural coagulant and microbicidal agent it does not have toxic effects on humans.

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