



Use of *Strychnos Potatorum* Seed Powder As a Water Purifier: A Sustainable Approach for Rural Development.

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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. Strychnos potatorum seed powder helps to control water borne diseases which spread through drinking water from open water reservoirs. 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 Strychnos potatorum 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 Strychnos potatorum plant.

KEYWORDS : Natural coagulant *Strychnos potatorum* seed powder, rural populations, unsafe drinking water sources, coagulating and purifying efficacy.

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.

Sanskrit writings from India reported that the seeds of *Strychnos potatorum* were used to clarify turbid surface water over 4000 years ago. So, the species was logically named as clearing nut tree or nirmali. *Strychnos potatorum* is a moderate sized tree found in Southern and central part of India, Sri Lanka and Burma, used predominantly as a medicinal extract. The seeds resemble those nuxvomica but are non-poisonous. The ripe seeds are used for clearing nut. This also indicated that they were the first reported plant-based coagulant used for water treatment. Nirmali seed extracts are anionic polyelectrolytes that destabilize particles in water by means of interparticle bridging. It was reported that the seed extracts contain lipids, carbohydrates and alkaloids which contain – COOH and free –OH surface groups which enhance the extracts' coagulation capability kajithoju et al, 2012 instead of maithi,2004. Although the specific coagulation mechanism associated with nirmali seed extracts has not been extensively investigated, one can assume that the presence of copious amount of –OH groups along chains of galactomannan and galactan provides weakly but abundant adsorption sites that ultimately lead to the aforesaid coagulant interparticle bridging effect. Due to the presence of natural coagulant and antimicrobial activity, seed powder was used to coagulate-flocculate or precipitate microbes and turbidity in water kajithoju et al., 2012. instead of maithi 2004. Furthermore, there appears to be little current effort to encourage or disseminate such treatment for household water or determine its acceptability, sustainability, costs and effectiveness in reducing water borne infectious diseases (Kajithoju et al., 2012). The present study shows activity

of *Strychnos potatorum* seed acts as water purifier.

Materials and Methods

Sampling site of Ground water in open well near Umberli in Dombivli, Maharashtra. *Strychnos potatorum* seeds were collected from Tarewadi, Kolhapur. *Strychnos potatorum* seeds due to their hard structure, could not be powdered in a grinder. In such a case the seeds were kept immersed in 50 ml water containing 2ml conc.HCl. After a week, the mixture was mashed to a soup-like solution and was washed through a nylon. The material retained on the cloth was oven dried for 24 hours at 103°C to 105°C and weighed. By calculating the weight of the seeds dissolved, the strength of the stock solution was determined (Babu and Chaudhuri, 2005). Powder used as coagulant and purifier.

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 24-48hrs. 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

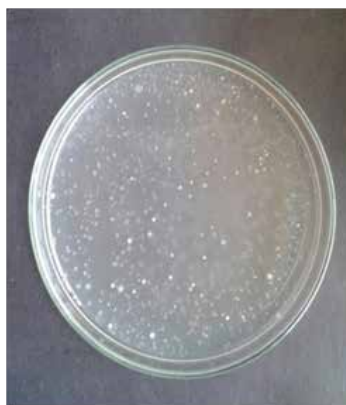
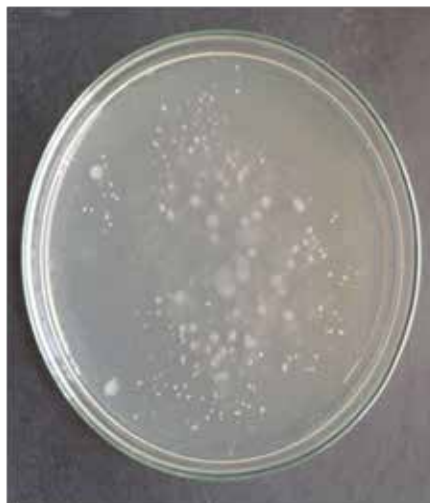


Fig.1 showing maximum no. of bacterial colonies**Fig.2 treated water with seed powder 50mg/l showing less no. of microbial colonies than fig.1****Fig.3 treated water with seed powder 100mg/l showing lesser no. of microbial colonies than fig.1 and 2****Fig.4 treated water with seed powder 150mg/l showing least no. of colonies than fig. 1,2,3.**

In present study, treatment of *Strychnos potatorum* seed powder was given to ground open well water samples in different concentrations like 50mg/l, 100mg/l, 150mg/l to study its coagulation and 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 *Strychnos potatorum* seed powder. Observations showed that on plates inoculated with untreated water sample maximum number (682) of colonies were developed in fig.1. Seed powder treatment of 50mg/l showed development of less number (563) of microbe colonies in fig.2 than untreated water sample plates. The plates inoculated with water sample treated with 100mg/l developed less number (438) of colonies in fig.3 than former plates. The treatment with 150mg/l concentration showed development of least numbers (155) of microbial colonies in fig.4.

Result and Conclusion

As per the observation it is clear that on the plates inoculated with water sample treated with 150mg/l concentration of *Strychnos potatorum* seed powder developed least number (155) of microbial colonies and plates inoculated with untreated water sample develops maximum number (682) of microbial colonies. So, we conclude that seed powder of *Strychnos potatorum* has coagulation and antimicrobial property and has minimized many numbers of microorganisms presents in untreated water sample. Thus *Strychnos potatorum* 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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