



Screening for Bacteria from Quarry Sand Exhibiting Antagonism for Microbial Pathogens

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ABSTRACT

This work has been undertaken for the screening for Antagonist bacteria from quarry sand collected from quarry industry from dust yard of various regions of Nallambakkam, Chennai and used to screen for antagonist bacteria by using MacConkey agar. Biological control is a component of an integrated pest management strategy. It is defined as the reduction of pest populations by natural enemies and typically involves an active human role. All insect species are also suppressed by naturally occurring organisms and environmental factors, with no human input. This is frequently referred to as natural control. This guide emphasizes the biological control of insects but biological control of weeds and plant diseases is also included. Natural enemies of insect pests, also known as biological control agents, include predators, parasitoids, and pathogens. Biological control of weeds includes insects and pathogens. Biological control agents of plant diseases are most often referred to as antagonists. Identified *Pseudomonas aeruginosa* from quarry sand, which help to kill and control the pesticides.

Keywords: Quarry sand; MacConkey agar; Siderophores; *Pseudomonas aeruginosa*; *Klebsiella pneumoniae*

INTRODUCTION

The possibility of employing antagonistic bacteria for postharvest control of gray mold on pear was studied. Approximately 175 strains of bacteria were isolated from beneath the skin of various fruits and vegetables and 14 of these possessed high levels of antagonistic properties [1]. The bacterial antagonist mixed with the fungicide at 50 ppm resulted in a greater control of the pathogen compared to the single ingredient. Holding bacteria-treated fruits at 20°C for 24 h before cold storage improved the efficacy of the bacteria against gray mold. Parasitoids are species whose immature stage develops on or within a single insect host, ultimately killing the host [2]. Many species of wasps and some flies are parasitoids. Pathogens are disease-causing organisms including bacteria, fungi, and viruses. They kill or debilitate their host and are relatively specific to certain insect groups [3]. Industrial waste is now a global concern, causing environmental and economic harm. Industries are rapidly trying to find a solution, searching for optimal ways to manage waste and to change the most common practices as landfill or incineration. The majority of bacterial species do not grow on synthetic media. Many non-growers require growth factors from other bacteria, but the nature of these compounds is largely unknown [4]. We show here that previously uncultured isolates from marine sediment biofilm grow on a Petri dish in the presence of cultured organisms from the same environment.

MATERIALS AND METHOD

Collection of Sample

Quarry sand was collected from the different region of quarry industry, nallambakkam. Where concrete rocks were crushed in different shape and size and lots of dust produces during cutting or crushing of rocks. That dust was collected from there to isolate the bacteria (Figure 1).



Figure 1: The samples collected from quarry industry

Isolation of Bacteria

Serial dilution process was done for the isolation of culture or bacteria. 20 sterilized and cleaned Petri-plates and test tube were taken for serial dilution. 5 plates of each samples 10^{-1} , 10^{-2} , 10^{-3} , 10^{-4} , 10^{-5} was done [5]. They were then plated in nutrient agar and MacConkey plates and 3 colonies grown in sample 1, given name as small colony, big colony and large colony. 3 colonies grown in sample 2 were given name as small colony, big colony and large colony. 2 colonies grown in sample 3, given name as small colony and big colony. Two colonies grown in sample 4 and named as small and big colony. They were then sub cultured (Figure 2).

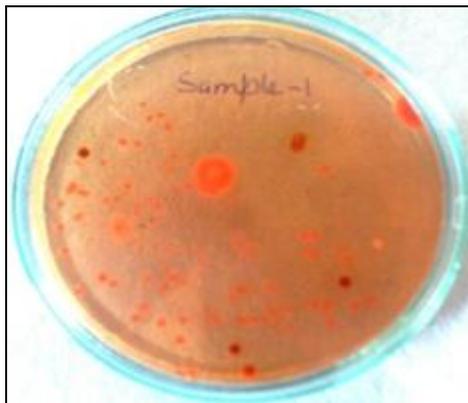


Figure 2: MacConkey agar plates

Identification of Bacteria

Indole Kovac's Test is a biochemical test performed on bacterial species to determine the ability of the organism to convert tryptophan into the indole [6]. This division is performed by a chain of a number of different intracellular enzymes, a system generally referred to as "tryptophanase". Triple Sugar Iron Agar Test is a microbiological test roughly named for its ability to test microorganism's ability to ferment sugars and to produce hydrogen sulfide. It is often used in the selective identification of enteric bacteria including Salmonella and Shigella.

Simmon Citrate Agar Test is a defined medium is used to determine if an organism can use citrate as its sole carbon source. It is often used to differentiate between members of Enterobacteriaceae. In organisms capable of utilizing citrate as a carbon source, the enzyme citrase hydrolyzes citrate into oxaloacetic acid and acetic acid. The oxaloacetic acid is then hydrolyzed into pyruvic acid and CO_2 .

RESULTS AND DISCUSSIONS

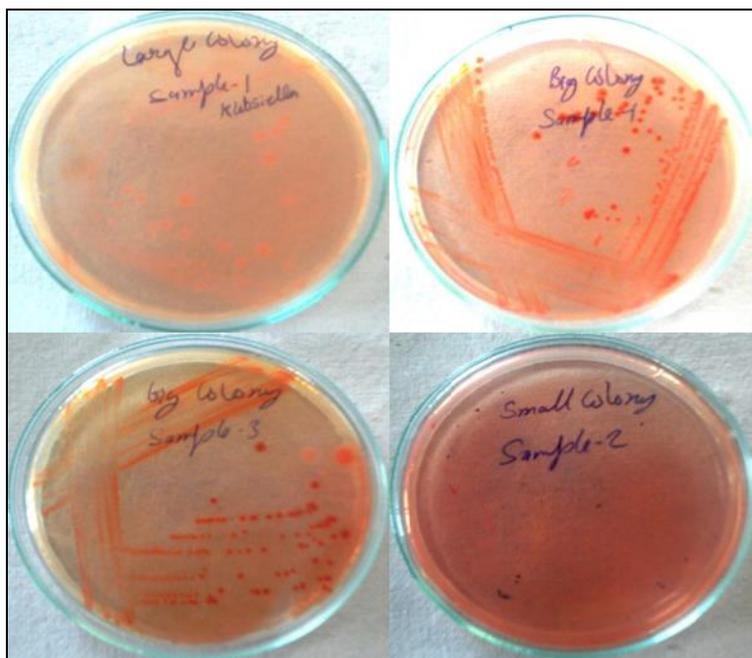


Figure 3: Identified bacteria

Figure 3 shows the identified bacteria were *Klebsiella Pneumoniae* and *Pseudomonas aeruginosa*. *Klebsiella pneumoniae* is a Gram-negative, nonmotile, encapsulated, lactose fermenting, facultative anaerobic, rod-shaped bacterium. Although found in the normal flora of the mouth, skin, and intestines.

Pseudomonas aeruginosa is a common gram-negative rod-shaped bacterium that can cause disease in plants and animals, including humans [7]. A species of considerable medical importance, *P. aeruginosa* is a prototypical "multidrug resistant (MDR) pathogen" is recognized for its ubiquity. From Figure 4, *Klebsiella pneumonia* was found to be more effective on pathogen.

Figure 4: Effect of bacteria on pathogens (sample-1, large colony/*Klebsiella pneumoniae*)

CONCLUSION

From the present study it was identified *Pseudomonas aeruginosa* and *Klebsiella pneumoniae* from quarry sand, which help to control the pesticides. *Pseudomonas aeruginosa* and *Klebsiella pneumoniae* is a common Gram-negative bacterium. That can cause disease in plants and animals, including humans. *Pseudomonas aeruginosa* is citrate, catalase, and oxidase positive. *Klebsiella pneumoniae* naturally occurs in the soil, and about 30% of strains can fix nitrogen in anaerobic conditions as a free-living diazotroph.

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