Ways We Employ Microorganisms In Various Industries

There are various uses of microorganisms in industries that are beneficial to everyday life. Because we cannot usually see them around every day, it is easy to overlook them. I will list three microorganisms, explaining briefly how each is important to our everyday lives. Microorganisms in the biotech industry are important because they produce citric acid employed in dyeing, inks, medicines, flavouring, and preservation of food. Microorganisms in waste treatment play a critical role in managing and treating domestic and industrial waste. And lastly, microorganisms in the pharmaceutical industry are used for the production of antibiotics, vaccines, and growth hormones.

Industrial microbiology or microbial biotech, both used interchangeably, applies to the scientific and engineering in the processing of materials by microorganisms (bacteria, fungi, algae, protozoa, and viruses) or plant and animal cells to make useful products (SIMB, 2014). An example of a microbe associated with this industry is Botulin toxin insecticide, a bacterial product that is used in the production of medicines and pest control. It is a very rare but serious condition caused by toxins from Clostridium botulinum. This is a harmful bacterium that thrives and produces toxins in the environment with very little oxygen, such as canned goods. It can also cause a serious infection if gets inside of an infected wound. The most common form grows inside an infant's intestinal tract, usually between the ages of 2 months and 8 months (www.mayoclinic.com). Problems specific microbes cause in this industry is growth inhibition and decreasing pH levels. A harsh condition creates toxic compounds that inhibit fermentation performance (SIMB, 2014). Examples of specific microbes that inhibit growth and decrease pH are fur aldehyde and 5-hydroxymethyl furfural, which result in pentose and hexose dehydration (Mills, 2014). Escherichia coli helps to solve this problem growing under conditions that require the use of oxygen. Citric acid is also used in the biotech industry, it is derived from natural sources, like lemon, lime, and orange and produced by microbial fermentation, using Aspergillus niger (Aghdam, 2015). A study was done between 1893 and 1895 where a German botanist, Wehmer, isolated two strains to produce citric acid and later named Citromyces spp. (Penicillium), but this practice caused contamination problems, and the long fermentation process time (Bauweleers, 2014). The process of fermentation takes place with the help of bacteria called, Lactobacillus casei, it removes harmful bacteria like Helicobacter pylori (Adnan, 2015). A similar bacterium, Saccharomyces boulardii, helps to reduce the risk of antibiotic-associated diarrhoea (Adnan, 2015).

Microorganisms in waste treatment play a critical role in managing and treating domestic and industrial waste. Wastewater treatment is a biological process that breakdowns and removes nutrients and organic material in the wastewater. If left untreated, microorganisms can cause diseases and bacterial contamination. Sewage treatment is a residential, institutional, commercial and industrial establishments originate process in which pollutants are removed and it. Pathogens may enter waters through point and nonpoint sources. Biological wastewater treatments employ microorganisms to remove organic matter from water. Organic matter or pollutants stem from a number of sources, such as drainage systems or acid rain (www.nchaisa.com). Microorganisms in wastewater treatment result in fats, oils, and grease removal, reducing biochemical oxygen demand and odour elimination. There are several specific microbes that play a vital role in the decomposition of waste and are considered a threat

to public health. These specific forms of bacteria create toxins that cause disease in the host organism; examples include, Salmonella, E. coli, Streptococcus, and Pseudomonas aeroginosa, (Tang, 2017). Purifying water is one of the most successful means of preventing the spread of these microbes in society. A sludge creates a suspended matter also known as a parasitic bacterium. When they encounter a supply of nutrients, they feed by taking in food directly through the cell wall and reproducing quickly (Tang, Sciencing.com, 2017). Among the most numerous types of bacteria in sewage, the most common types are faecal coliforms, which originate in the intestines of humans and travel via human discharges. Saprophytic bacteria devour dead substances, which helps to break down waste into inorganic and organic byproducts. These bacteria play a vital role in the treatment of sewage by facilitating or accelerating the decomposition process of organic matter (Tang, 2017). Microbes that can be used to treat problems in wastewater or improve the digestion process include Bacillus strains and two types of Pseudomonas: Pseudomonas fluorescens and Pseudomonas putida (www.clrblu.com). Bacillus is used for treating fats, oils, greases, and protein and the Pseudomonas both have different benefits that are beneficial to the treatment of ponds during the winter months.

Microorganisms in the pharmaceutical industry are used for the production of antibiotics, vaccines, insulin, and growth hormones, by nature; cells fight microbes that enter our body. The study of microbes will help determine specific diseases. Microbes involved in this industry are E. coli and Candida albicans, which are yeasts found in the human gut. The microorganisms in this industry aid in the production of antibiotics, vitamins, enzymes, and vaccines that are very helpful to healthcare. Pharmaceutical products, whether manufactured in the hospital or industrial environment has the potential to be contaminated with microorganisms, so protocols are in place to prevent possible microbial contamination (Satya, 2015). New antibiotics can be slow to work, but resistance to bacteria is decreasing existing drugs that are posing a very harmful threat as infections become untreatable. There are at least 10 antibiotic-resistance bacteria that are present in humans in some way or another. Streptococcus pyogenes, causes sore throats and skin disorders that cause over 700 million infections every year with a mortality rate of 25% in serious cases (www.longitudeprize.org). Once infected these bacteria can cause sore throat, impetigo and scarlet fever. Clostridium difficile causes diarrhoea, it is known as the “superbug” because of it consistent presence in hospitals or long-term care facilities. C. Diff is actually increased by exposure to antibiotics and a person is more likely to get ill from an internal imbalance. Immunization is also making a once rare or non-genetic variant of pathogens more prevalent because vaccine-primed antibodies cannot easily and attack shapeshifters that look different from vaccine strains (Moyer, 2018). In 1992 the U.S. Centers for Disease Control and Prevention (CDC) began promoting a new vaccine for pertussis, caused by the bacteria Bordetella pertussis (Moyer, 2018). The old vaccine was made using bacteria that incited an effective immune response but also caused rare side effects, like seizures (Moyer, 2018). Medicines are always taking stride inpatient care, it just takes a microscope to see them. While there are many bacteria that cause harm, there are just as many that improve health. These bacteria are geared toward the detection of diseases such as cancer, diabetes, Crohn’s disease and even periodontitis. E. coli can also be good for the body; researchers have used it to detect the presence of tumours or glucose. Probiotics prevent and treat health conditions such as diarrhoea, ulcerative colitis, Crohn’s disease and eczema. Examples of probiotics are Lactobacillus acidophilus, which is found in yoghurt, it treats bacterial infection of the vagina. It comes in many forms and each form is used for individual treatments. Another example, Bifidobacteria helps relieve symptoms of Irritable Bowel Syndrome, like abdominal pain, gas, and bloating. Bacteria can grow in our bodies and act as

protectors (Bremer, 2015).

In conclusion, microbes is present in all walks of our lives, there is a constant interaction of the microbes on human life. The majorities of the bacteria are harmless by the protection of the immune system and fight against other microbes, which live on the surface of the human body. They help purify wastewater in water treatment facilities and produce various products that are very useful to humans and the environment.

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10. Ways We Employ Microorganisms 7
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