BIODEGRADATION OF 2, 4 DCP HERBICIDE BY *STREPTOMYCES COLLINUS* ISOLATED FROM WASTEWATER TREATMENT PLANT IN EASTERN ALGERIA

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Abstract:

Wastewater treatment plants are the place where most pollutants are transported. 2, 4 DCP is an herbicide widely used in agriculture. This carcinogenic pollutant is very dangerous because it can reach surface waters through runoff and deep waters widely used by humans and animals. Water treatment plants are a reservoir of multiple and varied microorganisms, able to eliminate the toxic effect of many pollutants. The actinobacteria by their impressive metabolic abilities, are among the most appreciated microbial agents in the bioremediation of these hydric sites. In order to evaluate the functionality of the Ibn Ziad station in Constantine, we tested some physicochemical characteristics and the biodiversity of actinobacteria able to tolerate and degrade 2, 4 DCP. Sampling was carried out on raw wastewater, treated water and aeration tank water. The parameters studied were temperature, pH, conductivity, salinity, BOD5, DOC and suspended matters (MES). Actinobacteria were isolated on four selective media, namely AF, modified Czapeck dox, ISP4, Olson. The determination of herbicide biodegradation capacity by these bacteria was tested first on a minimum solid medium supplemented with 50 mg/L of 2, 4-DCP as a single carbon and energy source. Isolates that grew on this medium were cultured in liquid medium in the presence of 50 mg/L of the same pollutant. The degradation kinetics were monitored by HPLC. The best performing isolate was identified by phenotypic and molecular methods. The results show slightly alkaline pH, ambient temperatures. The DOC/BOD5 ratio is less than three, which indicates a slightly biodegradable effluent. While the MES concentration is around 256.7 mg/L. This station shows an important biodiversity of actinobacteria, with 25 isolates, among which 18 are able to live in the presence of 2, 4-DCP. The study of the kinetics of growth and degradation shows a good performance of an isolate, with a degradation rate of 45% after one month of incubation. The polyphasic identification of this bacterium, allows to assign it to the species Streptomyces collinus strain NBRC 12759 16S. These results show that the waters of this

station are rich in actinobacteria able to degrade the herbicide 2, 4-DCP. These bacteria can be used in the bioremediation of water ecosystems polluted by this phytosanitary product.

Keywords: 2, 4-DCP, actinobacteria, Biodegradation, wastewater.