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BIOLOGICAL TREATMENT OF ALPHATIC COMPOUNDS BY THE YEAST *CANDIDA TROPICALIS*

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ABSTRACT : Water pollution by oil took wide attention since past century. Using microorganisms for elimination of pollution increased in scientific research. At this study, one hundred and nine *Candida tropicalis* previously isolated from polluted water of river creeks at Basrah city, were used to evaluate the oil aliphatic compound absorption by yeast. Yeast shows the ability of bioaccumulation of aliphatic compounds which was done by estimation of absorption ratio of aliphatic compounds after incubation with yeast cultures for 24 and 48 hours using GC system. The bioaccumulation rates range between 50-300 mm^2 and 50-200 mm^2 during 24 and 48 hours, respectively. Thus, it can be concluded that using such microorganisms can help in reduc oil pollution in water of rivers.

Key words : *C. tropicalis*, aliphatic compound, bio-accumulation.

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INTRODUCTION

Biotechnology is one of the fields of applied and technological sciences based on the unique properties of biomaterials. It is also known in its broad sense as the totality of technologies that use biological systems and living organisms or their components to produce, modify or develop products or processes for specific uses that may be of value and benefit to humans (Qandil, 2007). Environmental pollution works to add an element that does not exist in the ecosystem, or it increases or decreases the presence of one of its elements in a way that leads to the inability of the ecosystem to accept this matter, which leads to a defect in this system (Ibrahim, 2013).

Accordingly, this pollution must be eliminated by modern biotechnological methods with the best results and the lowest economic costs. This technology is called bioremediation.Biological treatment is carried out by selecting living organisms that can rid us of some pollutants in the surrounding environment (water - air - soil) and when choosing a living organism, whether it is a plant, animal or a microscopic organism (bacteria - fungi – algae) and if the process of getting rid of pollutants or treating them using modern biological methods is the solution proposed for scientific research by scientists, the basic solution that we have and can implement is controlling the quantity and quality of pollutants emitted from human activity as well as reducing the size of these pollutants until we reduce the size of the problem or at least not It is rapidly deteriorating. We are trustees on this planet. We must fulfil the trust and secure it for our children and grandchildren in a way that enables them to live in safety until God is satisfied with us and we deserve to be His successors on earth (Amer, 2001).

That is why the topic of our research was chosen the biological treatment of some environmental pollutants in the waters of Basra Governorate using microorganisms (yeasts).

Hydrocarbonsare volatile organic compounds that include a wide range of chemicals that contain carbon (C) and hydrogen (H) and are naturally found in the atmosphere, including methane (CH_4) and its concentration is 1.68 parts per million, and natural levels of it do not cause any harm, and hydrocarbons are produced from combustion Incomplete kazulene in car engines and from solvents used in various industries as

well as its emission from chemical plants and oil refineries and living organisms have the ability to accumulate organic pollutants in their tissues in concentrations higher than what is present in the environment. Bioaccumulation is defined as the ability of living organisms to take pollutants and concentrate them in their tissues with concentrations greater than what is present in their environment.Several factors affect the bioaccumulation of environmental pollutants, including temperature, oxygen, pH function, salinity and other factors, but these factors are the most influential on biological treatment (Terytze, 1999). It is necessary to understand how these organisms live to understand the greater part of their role in nature. Microorganisms (bacteria, algae and fungi) have the basis of their work in controlling and controlling between two different organisms and the environment in which they live. And the bulk of the natural and chemical properties of the environment such as (oxygen concentration - pH - oxidation strength between species - energy transformation, decomposition .... and many chemical changes that occur in the environment).The aim is to understand the importance of the role of these organisms in the control and control they play in the environment from events.

MATERIALS AND METHODS

Yeast isolates : Two species of *Candida* viz *C. tropicalis* and *C. glabrata* previously isolated from water and sediments of Basrah water bodies were used in this study.

Yeast grown on PDA medium and store in refrigerator until used.

Preparation of concentration of crude oil to the test by yeasts

Crude oil from the rivers field life of a specific gravity for the purpose of removal biological experiments by yeasts were exposing crude oil for weathering snapped 30 g of it and put it in flask 100ml and then subjected to evaporation at a temperature of 40^0C. for a period of five days where measurement of weight every 12h. For the first day and during which then once every 24h. Followed by the lack of difference in weight weathering process is complete guide (Davis *et al*, 1977) and then sterilizes crude oil (Shamshoom *et al*, 1989; Higashihara *et al*, 1978; Walker *et al*, 1978) after used the concentration of 0.2g / 100ml of the metal media of yeasts.

Susceptibility testing of yeasts remove or the accumulation of alphatic compounds.

Preparation has been the concentration 0.2g/100ml from crude oil by 25 flasks ,one flask as control without adding yeast isolate and the rest divided into two groups of 12 each isolate and for the isolation of time 24h. and 48h. where it was added 0.5g of yeast in each flask at room temperature on a rotary shaker at 120 rpm. At the end of incubation duration, the biomass was separated by centrifugation at 4000 rpm for 30 minutes and supernatants were separation of the into Alphatic and aromatic compounds (Pothuluri *et al*, 1995) left to dry and then measured the concentration ofcompounds by GC device.

Equation calculating the proportion of compounds removed:

Where as: (Qin, Y. and Liu, J.2006). R% = ((C0 – C1) / C0) × 100 R = The percentage of removal. C0= The concentration of compounds in the primary solution. C1= The concentration of compounds in the final solution

RESULTS

The results of the device readings (GC) of the bioaccumulation rates of aliphatic compounds by yeasts during the incubation period of 24 and 48 hours are shown in the graphs.

Graphs are the results of the GC readings for the values of the absorption area (mm^2) for aliphatic

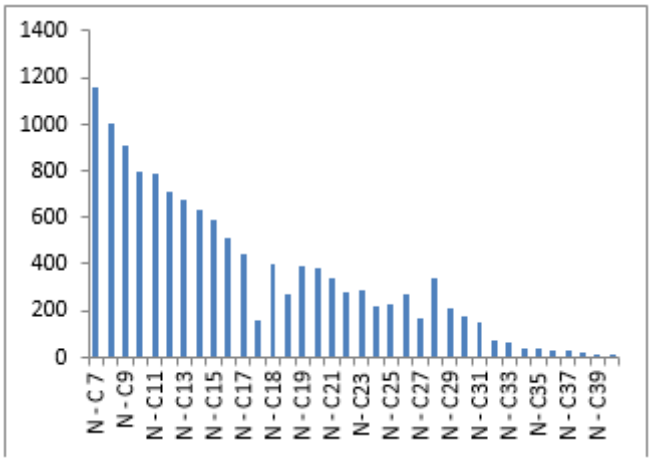

Fig. 1 : Standard sample of Alphatic compounds.

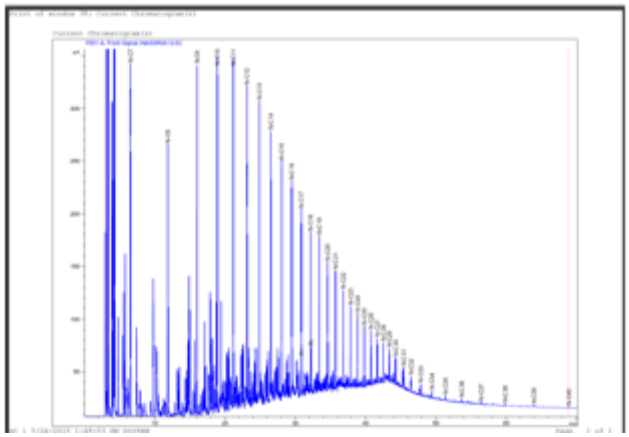

Fig. 2 : is the graph of a standard sample of alphatic compounds.

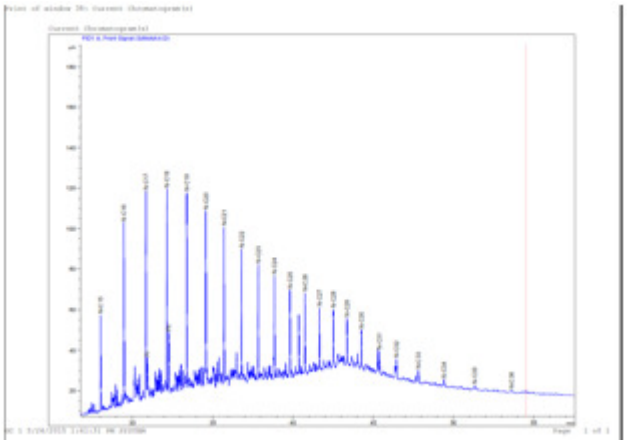

Fig. 3 : The graph shows the role of *C. tropicalis* yeast within 24 hours in removing percentages of alphatic compounds.

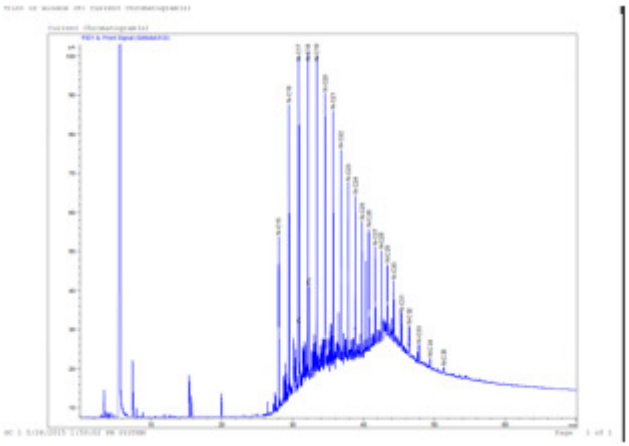

Fig. 4 : The graph shows the role of *C. tropicalis* yeast within 48 hours in removing percentages of alphatic compounds.

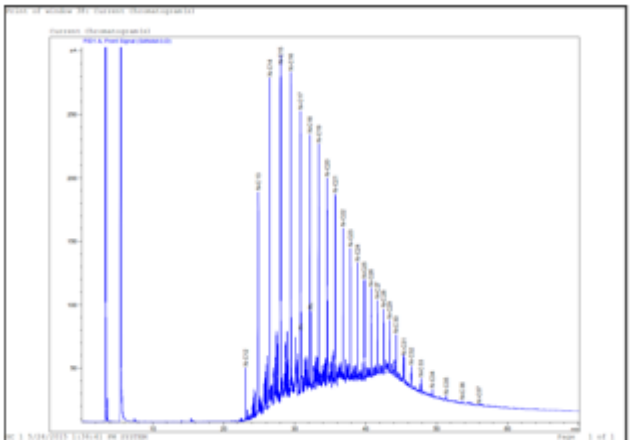

Fig. 5 : The graph shows the role of *C. glabrata* yeast during 24 hours in removing percentages of alphatic compounds.

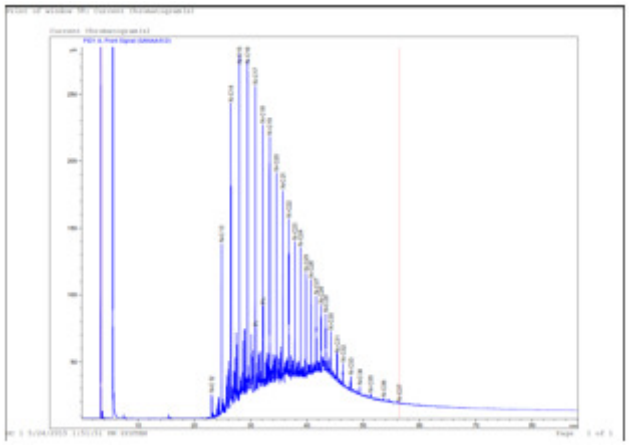

Fig. 6 : The graph shows the role of *C. glabrata* yeast during 48 hours in removing percentages of alphatic compounds.

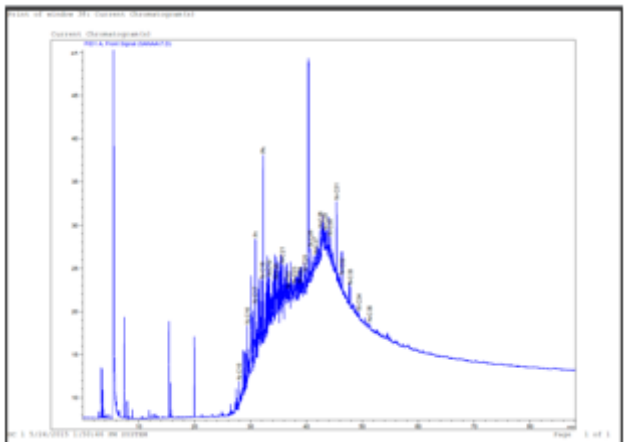

Fig. 7 : The graph shows the role of the two isolates together within 24 hours in removing percentages of alphatic compounds.

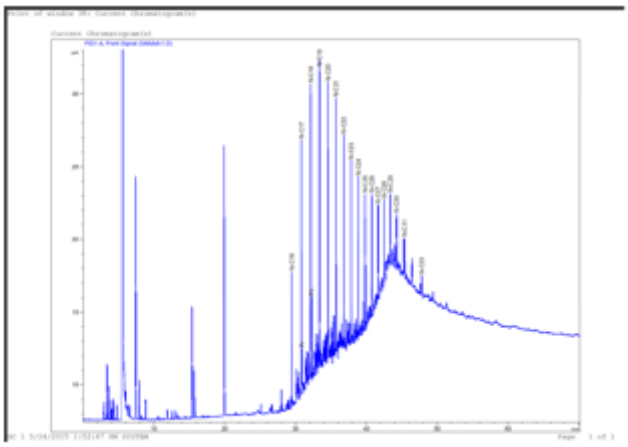

Fig. 8 : The graph shows the role of the two isolates together within 48 hours in removing percentages of alphatic compounds.

compounds.

As it was shown in Fig. 7 as mentioned in the results of the removal of aliphatic compounds that time has an important role in increasing the percentage of removal, and as noted previously and now in this figure, as the percentage of removal of 109 was recorded at the time of incubation 48 hours, while the percentage of removal of 87 was recorded at the time of 24 hours.

Fig. 8 shows the role of the selected isolates in the study in the case of isolation, that is, each isolate alone is treated and in the case of merging the two isolates, as *C. tropicalis* recorded a removal rate of 93, while C. *glabrata* was isolates had a removal rate of 28 and for the merging of the two isolates, it was 174.

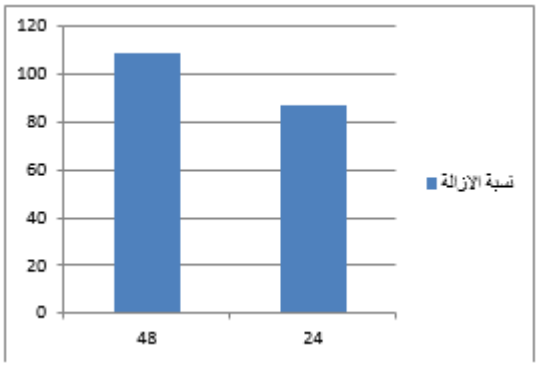

Fig. 9 : Effect of time on the percentage of biological removal (biological treatment).

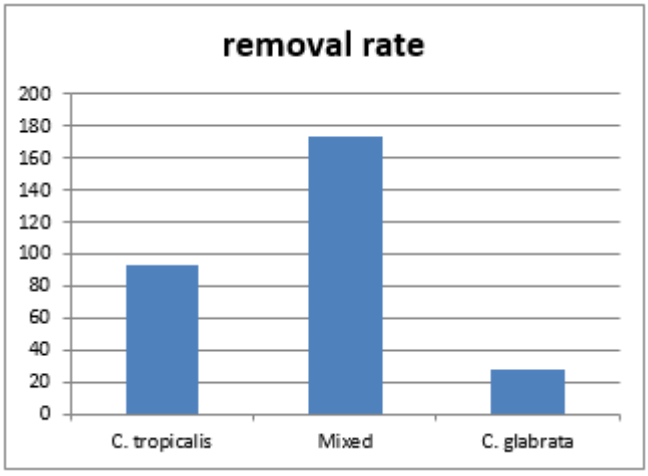

Fig. 10 : The role of the selected species in the study in biological treatment.

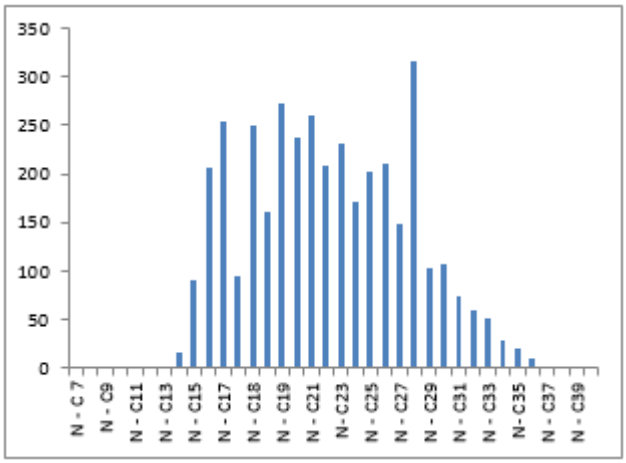

Fig. 11 : The role of *C. tropicalis* with biological treatment within 24 hours.

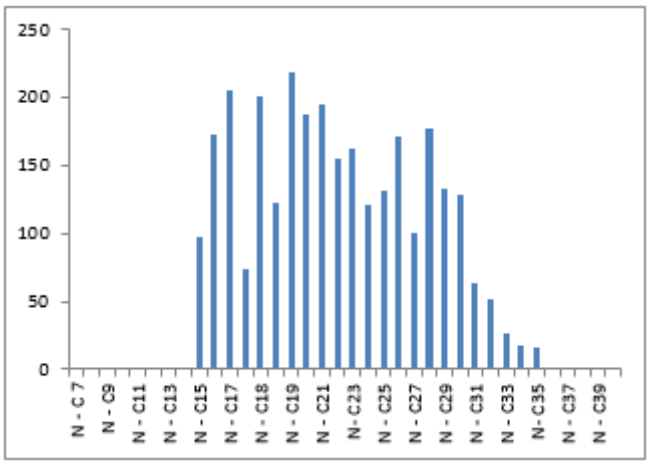

Fig. 12 : The role of *C. tropicalis* with biological treatment within 48 hours.

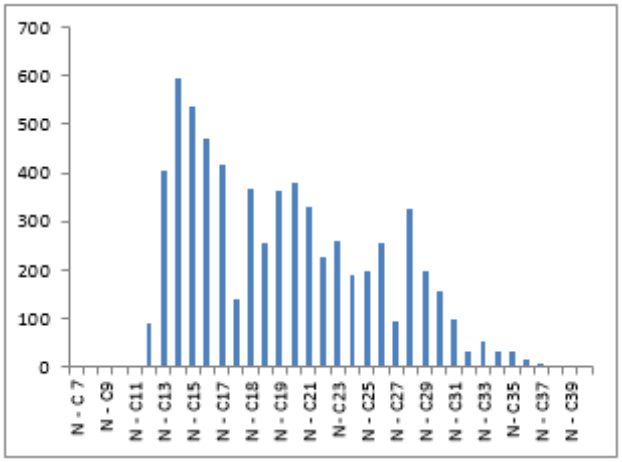

Fig. 13 : The role of *C. glabrata* in biological treatment within 24 hours.

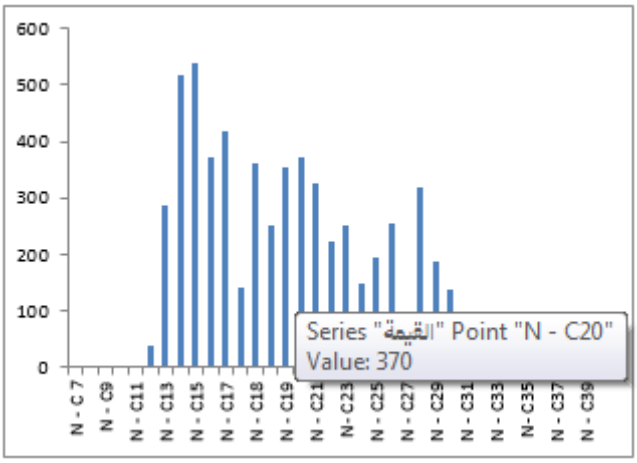

Fig. 14 : The role of *C. glabrata* in biological treatment within 48 hours.

And now we include the results of biological treatment by removing different percentages of alpha compounds by the species selected for the current study and during two periods of incubation (24 and 48) hours, as the isolate *C. tropicalis*, the absorption area ratios of compounds were recorded between (50-300) in the case of 24 hours of treatment, and in the case of 48 hours of treatment, it was between (50-200), while the isolate *C. glabrata* recorded the ratios of the absorption area of compounds between (100-500). In the case of 24 hours and 48 hours of treatment, but in the case of combining the two isolates, the ratios of the absorption area of the compounds were recorded between (20-160) in the case of 24 hours of treatment, but in the case of 48 hours of treatment it was

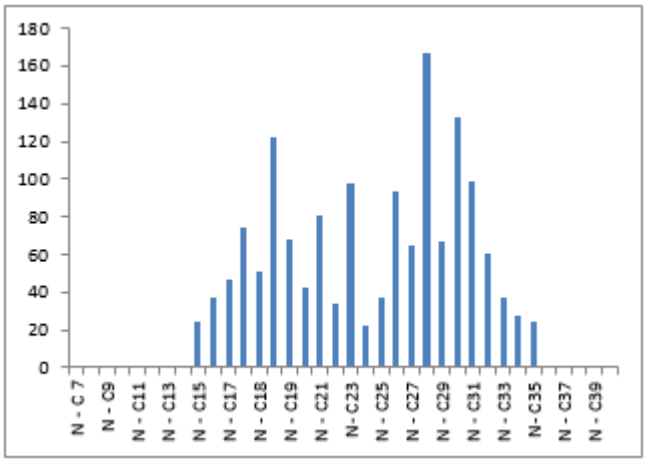

Fig. 15 : The role of the two isolates together in biological treatment within 24 hours.

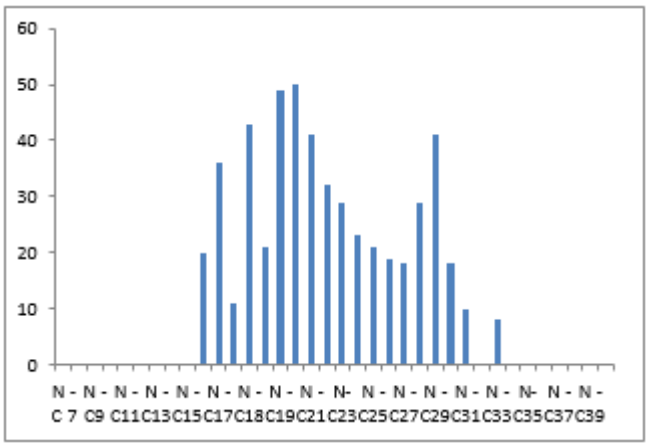

Fig. 16 : The role of the two isolates together in biological treatment within 48 hours.

between (5-50). This is illustrated by the following figures (11-16). The statistical results showed that *C. tropicalis* isolates are superior to *C. glabrata* isolates with biological treatment, and the combination of the two isolates is superior to each isolate alone.

DISCUSSION

The ability of microorganisms to secrete extracellular enzymes as well, this characteristic gave these organisms a distinction in their ability to all or some biological treatment processes and that the isolate chosen for the current study possesses this characteristic and this was confirmed by researchers in their studies in the test of the isolate *C. tropicalis* on the secretion of exogenous enzymes Cellular enzymes, including Cellulose, Proteinase, Lipase and Alpha - Glucosidase (Sulman and Rehman, 2013; Bramono *et al*, 2006).

These microorganisms are widespread in the soil and water, as scientists have identified about 200 groups of microorganisms that feed on the components of oil spills, and include, in addition to bacteria, types of fungi and yeasts. Researchers have found that a number of microorganisms that can analyze petroleum materials can at the same time transform oil slicks into very fine droplets in water (http://www.actcleaners.com. 2012).

Perpetuo *et al* (2011) study indicated. Bioremediation is the use of microorganisms (bacteria, fungi, algae) to remove pollutants from the environment, and it provides an economical and safe alternative compared to traditional methods.

The study by Hopner *et al* (1992), the process of breaking down oil by microorganisms is called biocracking. It is made by fungi, yeasts and other organisms (Hopner *et al*, 1994 and Lemos *et al*, 2001).

Csutak *et al* (2010), on the use of yeasts as a means of biological treatment for the increase in pollutants in factories and homes and oil spill accidents, which led to the deterioration of the ecosystem in Romania, so the yeasts were benefited from and because they are easy to obtain and provide appropriate environmental conditions of temperature, acid function and oxygen ratio Nutrients and other physical factors were found to be distinguished in the biological treatment of waste, especially oil, due to some types of them possessing the cytochrome P450 system gene, and those types were Candida, Rhodotorula, Trichosporon and others.

The disintegration and decomposition of crude oil hydrocarbons is of great benefit to transforming the latter into other types that are less toxic and less dangerous to the environment (Xu, 2001).

Researchers have been confirmed through their studies to note the role of many types of bacteria and fungi and how they decompose crude oil using the bioprocessing technology for hydrocarbon compounds (Ijah, 1998; Chaillan *et al*, 2004; Elshafi *et al*, 2007 and Nievas *et al*, 2008).

All of these studies agreed with the results of our current study.

CONCLUSION

Our current study confirmed the role of yeasts in bioremediation technology in eliminating or reducing oil environmental pollution and its negative effects on the aquatic and terrestrial environment for all living organisms.

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