

# Increased production of antioxidants in the presence of cadmium by *Promicromonospora* sp. UTMC 2243

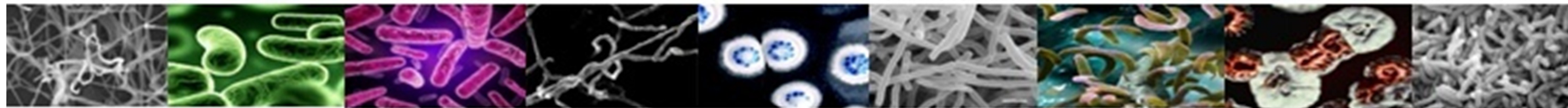
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## Introduction

Reactive free radicals are detrimental agents which have various side effects cause many diseases such as cancer, atherosclerosis, etc. They also play an important role in deterioration of food. Therefore, antioxidant compounds with high performance are still demanding. Microbial bioactive metabolites are a source of antioxidants. *Promicromonospora* sp. UTMC 2243 is a rare filamentous actinomycete which was used in this experiment for considering its ability to produce antioxidants. In Previous studies resistance and removal of heavy metals has been shown by *Promicromonospora* sp. UTMC 2243. In this study increased production of antioxidants in the presence of cadmium ions was evaluated.

## Materials and Methods

The ISP2 media with different concentrations of cadmium chloride (0, 4.6 and 9.2 mM.5% v/v) was used to ferment the *Promicromonospora* UTMC2243.

After fermentation, extraction with solvent was done to obtain crude extracts of each medium. Extracts were separated by TLC plate with mixture 5%metanol and dichloromethane. Afterward DPPH (1, 1-diphenyl-2 picrylhydrazyl) was sprayed on TLC plate and kept in a dark place for one hour. The yellow spot appeared on purple background. All experiments were carried out in triplicate. Next different concentrations of obtained extracts were used for free radical scavenging activity. Volumes of 10 µl of various concentrations of obtained extracts (solutions with 100, 200 and 300 µg of extract/ mL of methanol) and Ascorbic acid and BHT (solution with 10, 20 , 30 µg/ml) were mixed with 200 µl of methanolic solution containing DPPH radicals (0.005%w/v). Each mixture was shaken vigorously and kept in a dark place for half hour and afterward the absorbance was read against a blank at 545nm. Inhibition of free radical DPPH in percent (I %) was calculated in following equation:

$$I\% = (A_{\text{blank}} - A_{\text{sample}} / A_{\text{blank}}) \times 100$$

where  $A_{\text{blank}}$  is the absorbance of the control reaction) containing all reagents except the test compound), and  $A$  is the absorbance of the test compound.

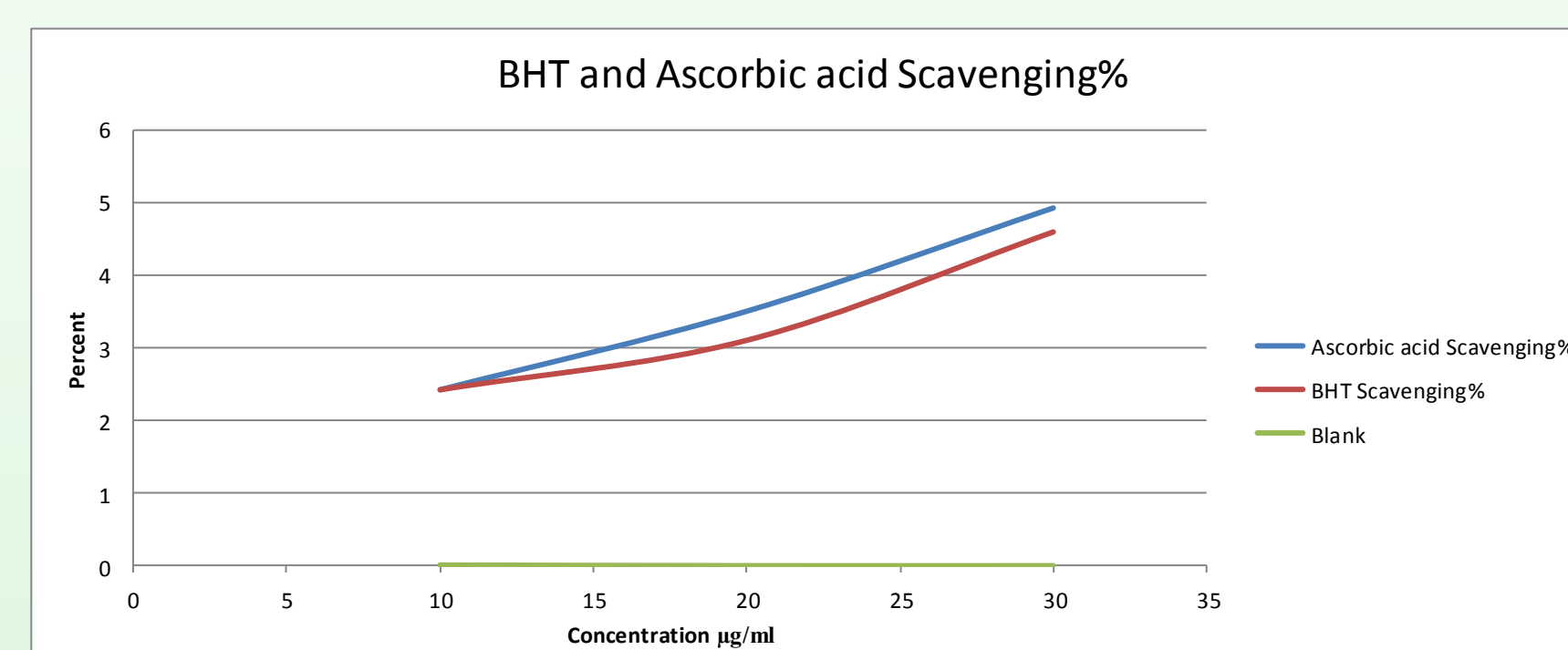
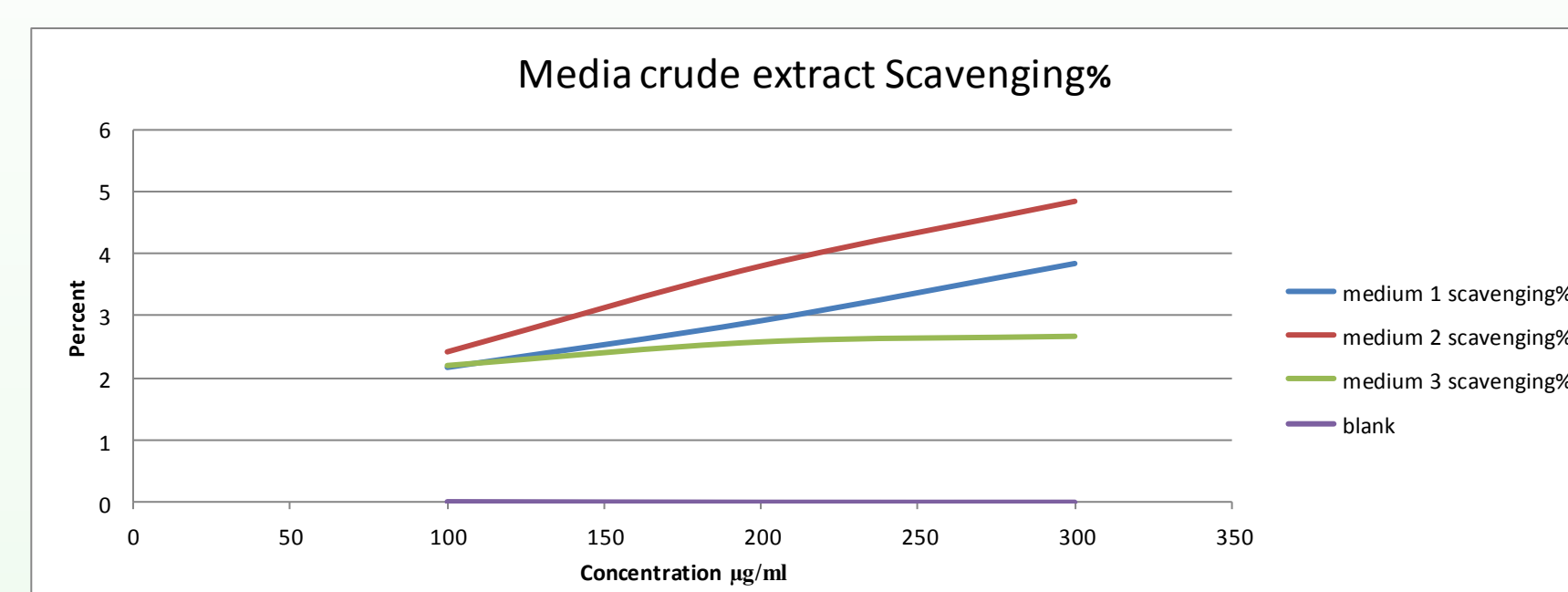
The extract concentration providing 50% inhibition (EC50) was calculated from the graph of scavenging effect against extracts concentration.

| Media   | Composition  |
|---------|--|
| Medium1 | Glucose and yeast extract 4g/l respectively, commercial malt extract 10 g/l                          |
| Medium2 | Glucose and yeast extract 4g/l respectively, commercial malt extract 10 g/l, Cadmium chloride 4.6 mM |
| Medium3 | Glucose and yeast extract 4g/l respectively, commercial malt extract 10 g/l, Cadmium chloride 9.2 mM |

Table 1. Media composition

## Result

The results showed that, secondary metabolites produced in media with high concentration of cd have more antioxidant activity. Even at the sub-MIC concentrations of cadmium chloride, antioxidants production were increased excessively which was comparable with Ascorbic acid and BHT. Metabolites produce in absence, 4.6 mM and 9.2 mM of cadmium chloride had EC 70-80 % showed 85-95% scavenging activity compared to 45% and 55% for Ascorbic acid and BHT respectively .



## Conclusion

It can be concluded that growing the *Promicromonospora* sp. UTMC 2243 under the metal stress can enhance the amount of the antioxidants which are produced by that. This phenomenon can be used in mass production of the antioxidant compound(s) that is consequently required for their structure elucidation.

## References

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