



ISSN: 0975-766X
CODEN: IJPTFI
Research Article

Available Online through
www.ijptonline.com

ISOLATION OF PNP DEGRADING *BACILLUS* FROM SOIL IN THE VICINITY OF COCONUT HUSK COMPOST

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Received on 28-07-2016

Accepted on 01-09-2016

Abstract

Industrialization increases the level of hazardous organic pollutant, and metal pollutant to the environment. Paranitrophenol (PNP) is a compound used for the synthesis of pesticides and azo dyes. In this study bacterial resistance to such a toxic pollutant was analyzed. The soil surrounding the coconut husk compost was used as a source of microorganism that will degrade PNP. The bacterium was identified as *Bacillus sp* using biochemical assay. This *bacillus* showed higher activity of PNP degrading bacteria was observed in 100mg/liter.

Introduction

Biological approach to degrade the various pollutants is growing method to clean up our environment. Some Researchers have reported that *Brevibacteria* strain was mainly able to degrade PNP upto 300-mg/l. PNP degradation by microbes have been identified as bacterial species including *Arthrobacter*, *Bacillus*, *Flavobacterium*, *Moraxella* and *Pseudomonas* [1,2,3,4].

Accumulation of Para Nitro Phenol causes respiratory tract irritation, nausea, anorexia and difficulty in breathing. Intake of this chemical lead to form methenoglobin, which blocks the oxygen transport and showed cyanosis headaches and dizziness [6]. A large number of organophosphate pesticides can be synthesized from the derivatives of PNP [7]. This PNP can be used as one of the raw material for manufacture of aspirin on large scale [8]. The PNP derivatives are used in many industrial products of dyes, pigments for textile industry [9].

pH range indicators are made up of Nitro Phenols. Cytochrome P450 metabolism has been carried out through PNP as one of the intermediate compound and named as glucoromide conjugate [10]. Thus PNP can be used as a degradation product and parathion metabolites.

Materials and Methods

Soil samples were taken from around the vicinity of coir waste compost and was transferred to the polythene bags and stored at -20°C . The sample was added into 100 ml of minimal salt medium and kept in a rotary shaker at 37°C in 200 rpm for 48 hours. The turbidity of the medium implies the growth of an organism. From this, one ml of sample was transferred to the minimal salt medium whose glucose concentration (1 g/L) and PNP concentration (100 mg/L) and kept for 48 hours [11,12,13]. Coconut husk acted a carrier of phosphate solubilizing bacteria especially *Bacillus* [14,15] and hence was used to investigate the PNP degrading activity in this study.

Results and Discussion

The bacterium was isolated from soil was grown on Nutrient Agar medium by Streak plate method. The colonies showed yellow color and it was confirmed by gram staining in the form of positive rod shaped capsulated bacterium and green color spores formation by endospore test. The biochemical assay showed the presence of *Bacillus sp* (Table 1).

Table 1: Biochemical test for microbial isolate.

S.No	Parameters	Result
1	Citrate utilization Test	positive
2	Urease	positive
3	Indole production Test	negative
4	Voges-Proskauer Test	negative
5	Glucose-lactose utilization Test	negative
6	Catalase Test	positive
7	Methyl Red Test	positive

The *Bacillus sp* had depredeating at 32% w/v of PNP per 100 ml of mineral salt medium. *Bacillus sp* showed higher degradability level of 100 mg/l (Fig 1). The optimum temperature and pH of *bacillus* was 37°C and 5.6. The PNP degrading bacteria could not utilize glucose and lactose for its activity only 48 hours(Table2).

Table 2: Para Nitro Phenol Degradation activity by soil isolate.

S.NO	PNP concentration (mg/l)	O.D at 600nm	Degradation Activity(%)
1	100	0.12	32
2	200	0.14	31
3	300	0.32	25

4	400	0.25	20
5	500	0.22	11

Conclusion

From this study it was found that the *Bacillus sp* isolated from the soil surrounding coir waste compost was found to degrade PNP. Thus the *Bacillus sp* can be used to protect our environment against pollution. Further work has to be carried out to substantiate these findings.

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