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PHYSIOLOGICAL CHARACTERIZATION OF POLYHYDROXYBUTYRATE (PHB) PRODUCED FROM SOIL BACTERIA

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Abstract

In the existing research, The soil sample had taken from Rajkot Industrial area via random soil sampling technique. The scrutinization of microorganisms has been done by 1% Glucose medium with spread plate technique. The morphological characterization of bacteria was completed by colony characterization with Gram staining technique. The chloroform extraction technique was used for the PHB (Polyhydroxybutyrate) extraction. The dry cell weight determination technique was performed for the quantification of PHB (Polyhydroxybutyrate).Where 23 bacterial isolates were originated with PHB production out of 28.The C-26 bacterial isolate was with highest yield which was further characterized by salt & PH tolerance activities.

Introduction

Polyhydroxybutyrate (PHB) is a kind of biopolymer that has gain awareness freshly unpaid to its hopeful biodegradable and biocompatible properties. PHB belongs to the family of polyhydroxyalkanoates (PHA) and is synthesize by diverse microorganisms as a carbon and energy preserve in the form of intracellular granules. PHB is a thermoplastic polyester and can be second-hand as a replacement for petroleum-based plastics due to its biodegradable nature.[1].

Properties of PHB:

PHB is a biodegradable polymer that has comparable physical and automatic properties to conservative plastics. PHB possesses more than a few properties that compose it an striking substance for a variety of applications.

Biodegradability: PHB is a biodegradable polymer, which means that it can be busted down by microorganisms in the environment into nontoxic substances like carbon dioxide and water. [2].

Biocompatibility: PHB is biocompatible, which resources that it is not damaging to living tissue. This belongings makes PHB an eye-catching material for medical applications, such drug delivery systems and tissue engineering.[3].

Thermal properties: PHB has a high melting point, which makes it appropriate for use in high-temperature applications. It also has high-quality thermal stability and can endure sterilization processes, which makes it an pretty material for medical applications.[4].

Water resistance: PHB is water-resistant, which means that it can be used in applications that necessitate resistance to water or moisture, such as food wrapping and agricultural films.[5].

Materials & methods

The soil sample was collected from Savla Steel Industries, Rajkot IGST by using random sampling technique [6].The isolation of bacteria was done using 1% Glucose medium with spread plate isolation technique [7].Physiological screening of PHB producing microorganisms was done by performing Sudan Black B staining technique.[8] The bioplastics as a PHB was extracted using chloroform extraction method [9] The quantification of DNA was done using dry weight measurement techniques.[10].Physical characterization of PHB was done by performing salt

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(0.1%,0.5%,1%,5% & 10%) and PH tolerance activity. (PH 2,4,6,9,& 11).[11]

Results & conclusion

The screening technique leads to 28 differ morphological colonial isolates in which 23 were producing PHB.The chloroform extraction methods were used for extraction. The isolates were given code up to C1 to C28 out of which C26 was potent producer had determined with 1.085 gms/litre produced PHB.The C26 has been found with potent growth at alkaline conditions. The C26 had also given various salt concentration but observed with no variation in the growth pattern. However the specific growth pattern has been observed with the good microbial population at PH11 as compare to other various PH which is provided.

Though it can be concluded like that soil bacteria is producing polyhydroxybutyrate which can be extracted and quantified by scientific experiments and can be optimized with various physical conditions for more yield of its with proven potential as a alternative to synthetic plastic.

Table-1 colony characteristics of C26

Characteristics	Observation
Size	Big
Shape	Irregular
Margin	Undulate
Texture	Smooth
Elevation	Flat
Pigmentation	Milky White
Opacity	Translucent

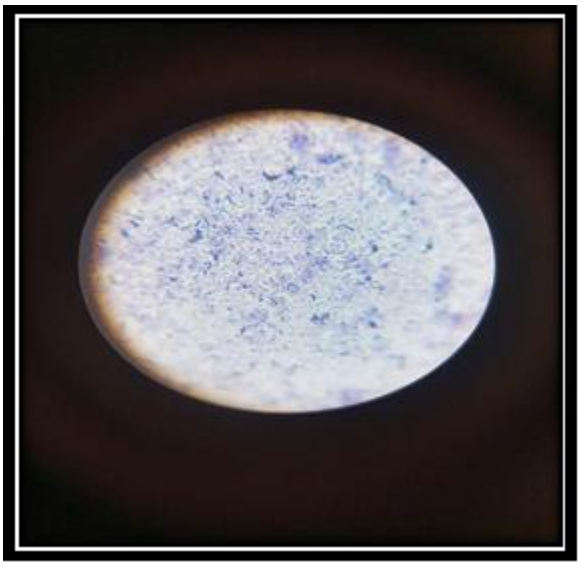


Figure 1: screening results of SUDAN black B staining of c-26 isolate



Figure-2: extracted polyhydroxybutyrate image of all isolates

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Vol 2/Issue1/ January--June/2026



Figure-3 extracted polyhydroxybutyrate image of C-26 isolates

Table-2 salt tolerance activities results of isolate C-26

Salt Concentration	O.D.(500nm)
0.1%	1.379
0.5%	1.341
2.0%	1.349
5.0%	1.615
10%	0.078

Table-3-ph tolerance activities result of isolate C-26

pH Level	OD at 500nm
2	0.03
4	0.5
6	0.8
9	0.96
11	1.26

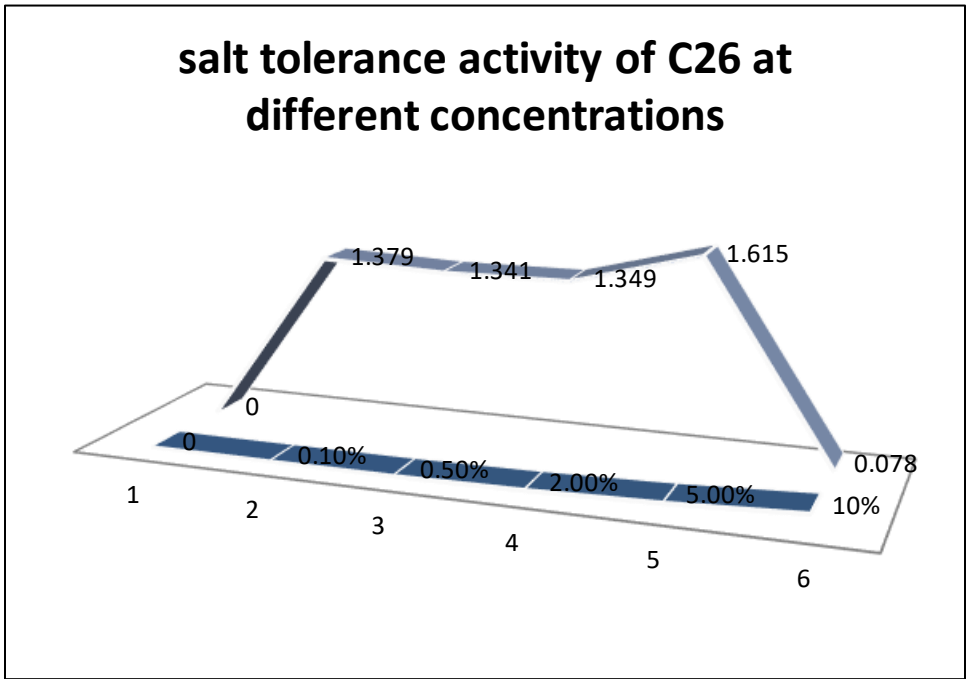


Figure-4: salt tolerance activity of C26 at different concentrations

ISSN: 3139-0951 (Online)
Vol 2/Issue1/ January--June/2026

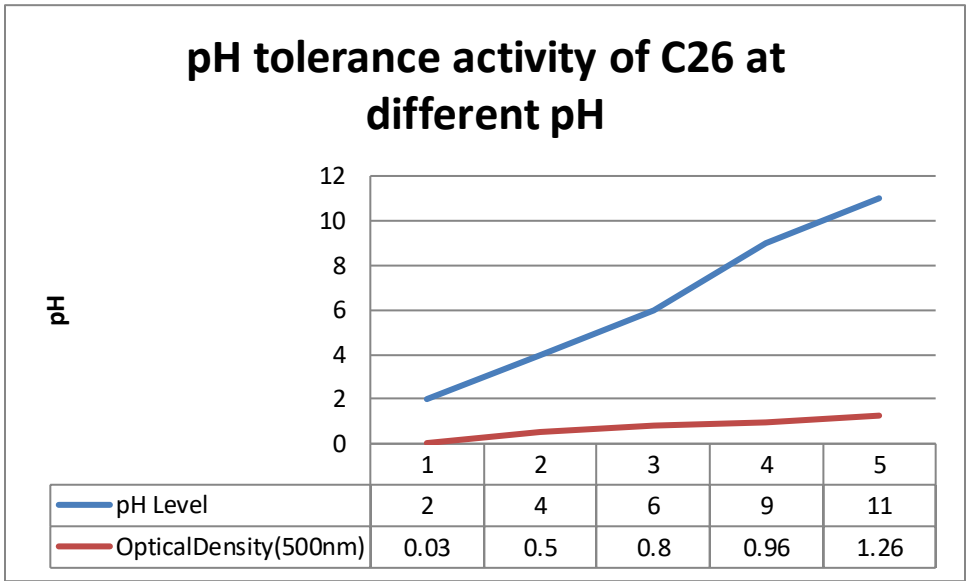


Figure: 5 pH tolerance activity of C26 at different pH

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ISSN: 3139-0951 (Online)
Vol 2/Issue1/ January--June/2026

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