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**COMPARATIVE ANALYSIS OF CORNSTARCH BIODEGRADATION IN  
COMPOST, CONTROL SOIL, AND ACIDIC SOIL CONDITIONS.**

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**COMPARATIVE ANALYSIS OF CORNSTARCH BIODEGRADATION IN COMPOST,  
CONTROL SOIL, AND ACIDIC SOIL CONDITIONS.**

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## **ABSTRACT**

### **COMPARATIVE ANALYSIS OF CORNSTARCH BIODEGRADATION IN COMPOST, CONTROL SOIL, AND ACIDIC SOIL CONDITIONS.**

This study examines the degradation behavior of cornstarch thin films under different environmental conditions to assess their viability as biodegradable plastic alternatives. The films were prepared using a solution-casting method with glycerol plasticizer and tested in compost, acidic soil, and control soil environments over 11 days. Results showed distinct degradation patterns, with compost soil producing intermediate degradation rates while acidic conditions caused complete breakdown by Day 5 due to enhanced hydrolysis. Pure cornstarch films demonstrated gradual degradation ( $SF^0$ ) (0.8% w/w/day), where the initial tensile strength is 8.008 MPa and the final tensile strength for  $SF^0$  is 3.535 MPa. FTIR analysis provided mechanistic insights: (1) A decrease in O–H stretching band intensity ( $3257\text{ cm}^{-1}$ ) indicated bond scission from microbial or enzymatic attack or acid hydrolysis, with a corresponding peak broadening due to disrupted hydrogen bonding; (2) The carbonyl band ( $1740\text{ cm}^{-1}$ ), if present from ester linkages of glycerol-starch interactions, showed reduced transmittance, confirming ester hydrolysis, particularly prominent in acidic soil; (3) C–O–C glycosidic linkage bands ( $1150\text{--}950\text{ cm}^{-1}$ ) exhibited peak shifts (e.g.,  $1020\text{ cm}^{-1} \rightarrow 1040\text{ cm}^{-1}$ ), suggesting starch backbone depolymerization. Surface observations confirmed that the thin films degrade faster in acidic condition compared to control and compost. This research provides new insights into environmental factor effects, supporting the development of tunable biodegradable materials for packaging and agricultural applications.

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