Archives of Microbiology (2024) 206:144
https://doi.org/10.1007/s00203-024-03865-0

ORIGINAL PAPER

# Novel report of *Acinetobacter johnsonii* as an indole-producing seed endophyte in *Tamarindus indica* L

**Ekta Bhattacharya[1] · Anjan Hazra[1] · Madhurima Dutta[1] · Rahul Bose[1] · Anisha Dutta[1] · Moumita Dandapat[1] · Titir Guha[1] · Suparna Mandal Biswas[1]**

Received: 31 October 2023 / Revised: 23 January 2024 / Accepted: 23 January 2024


**Abstract**

Plant–microbe associations have been regarded as an exciting topic of research due to their potential as environment friendly alternatives for stimulating crop growth and development. Seeds of *Tamarindus indica* L. have been chosen for the present study as seed endophytes prefer larger or nutritive cotyledon and hard seed coats for their colonization. The main objectives of our study were to isolate and identify the seed endophytes, their bioefficacy, and responsible chemical compounds. In a dose-dependent experiment, tamarind seed exudates (TSE) showed plant growth-promoting properties on *Oryza sativa* (53–81%), *Daucus carota* (10–31%), and *Raphanus sativa* (21–42%). Identification of the bacterial load in TSE through 16S rRNA sequencing revealed the existence of two bacterial species, *Acinetobacter johnsonii* and *Niallia nealsonii*. This is the first report of these two bacteria as seed endophytes of *Tamarindus indica* L. HRLC–MS analysis of TSE confirmed the presence of indole derivatives, primarily indole-3-lactic acid (ILA). The quantitative phytochemical estimation of bacterial culture filtrates revealed that indole-like substances were present in the extracts only in *A. johnsonii* at a concentration of 0.005 mg/ml of indole acetic acid equivalent. Experimental results suggested that the stimulatory activity of TSE was caused by the presence of *A. johnsonii*, a potential plant growth-promoting bacteria that produced indole-like compounds. This study suggests tamarind seed exudates with its endophytic microbiota as a potent plant growth-promoting agent that may find use as a cheap and sustainable source of metabolites useful in the agro-industries.

**Keywords** *Acinetobacter johnsonii* · *Niallia nealsonii* · Seed endophytes · HRLC–MS analysis · Indole-3-lactic acid · *Tamarindus indica* L

## Introduction

Endophytes help plants directly, either by aiding in the acquisition of nutrients such as phosphorous, iron, and nitrogen from the environment or indirectly by producing phytohormones such as auxins, IAA, gibberellic acid, and ethylene (Santoyo et al. 2016). It is evident that microbes can improve a plant's growth and defenses and that plants can choose their microbiome to keep beneficial colonists, such as those residing inside their tissue (Hardoim et al. 2012). In this perspective, seed microbiota is ecologically intriguing because they serve as both the culmination and the beginning of community assembly in the new seedling. In addition, they prove to be a prospective source of novel natural products to find plethora of applications in agriculture, industry, and medicine (Strobel 2003; Smith et al. 2008; Selim et al. 2012). According to recent assessments, there are over 300,000 plant species in the world, and each one is home to at least one endophyte (Nisa et al. 2015). In fact, endophytic bacteria have been discovered in all of the plant species that have been studied thus far. According to Partida-Martnez and Heil (2011), endophyte-free plants are extremely rare. It seems to reason that plants without endophytes would be more susceptible to disease attacks and environmental stress (Brader et al. 2017; Hossain et al. 2023). Throughout the course of a plant's life, from seed germination through fruit development, endophytic microorganisms (bacteria or fungi)

Communicated by Yusuf Akhter.

✉ Ekta Bhattacharya
ektabhattacharya1990@gmail.com

✉ Suparna Mandal Biswas
mondalsupa@gmail.com

[1] Agricultural and Ecological Research Unit, Indian Statistical Institute, 203, B.T. Road, Kolkata 700108, India

Published online: 09 March 2024