



## Impact of soil temperature, pH and carbon dioxide on the population and efficiency of fluorescent pseudomonad in the rhizosphere soil of *Pokkali* rice

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### ABSTRACT

The present study was aimed at the evaluation of soil temperature, pH and carbon dioxide evolution on the number and efficiency of fluorescent pseudomonads around the root system of *Pokkali* rice at Vytilla in Ernakulam district of Kerala. Two plots (40 m<sup>2</sup>) comprising control (without application of *Pseudomonas fluorescens*) and *P. fluorescens* treated plants were used for the field experiment. The isolates of fluorescent *Pseudomonads* or *Pseudomonas fluorescens* were counted and their efficiency was assessed for IAA, ammonia, HCN and siderophore production. Simultaneously, soil temperature, pH, and carbon dioxide evolution were also recorded. A total of 6 fluorescent pseudomonads (VPAU1, VPAU2, VPAU3, VPAU4, VPAU5 and VPAU6) were found during the crop period. All the isolates produced IAA and ammonia with varying degrees of intensity. Three isolates (VPAU1, VPAU3 and VPAU4) produced HCN, and no microbial isolates produced siderophore. The effect of soil temperature, pH, EC and carbon dioxide evolution was correlated with the number of fluorescent pseudomonads in the soil. The bacteria were significantly affected by pH and EC, whereas soil temperature and CO<sub>2</sub> evolution did not show any effect on the number of fluorescent pseudomonads. There was no significant influence of soil temperature, pH, EC and carbon dioxide evolution on indole acetic acid production, ammonia, and HCN production. Inoculated *Pseudomonas fluorescens* did not survive in *Pokkali* rice fields. However, further studies are needed for at least three seasons in *Pokkali* soils to confirm the results of the present study.

### Introduction

Upadhyay *et al.* (2011) reported that saline-tolerant PGPR can alleviate soil salinity stress during plant growth and exopolysaccharide (EPS) secreted by the bacteria. Different bacterial genera have been proposed to alleviate salt stress in plants, such as *Agrobacterium*, *Arthrobacter*, *Azotobacter*, *Azospirillum*, *Bacillus*, *Burkholderia*, *Klebsiella*, *Pseudomonas* (Costa-Gutiérrez *et al.*, 2020; Lami, *et al.* 2020), *Rhizobium*, and *Serratia*. Earlier studies have reported that the potential PGPR with plant growth-promoting traits should be able to

efficiently colonize the rhizosphere and survive under field conditions for effective use as bioinoculants (Amaya-Gómez *et al.*, 2020). Fluorescent *Pseudomonads* are the most promising plant growth-promoting rhizobacteria involved in the biocontrol of plant diseases, produce phytohormones, hydrogen cyanide (HCN), siderophores, indole-3-acetic acid (IAA), and antibiotics. Matsuguchi and Sakai (1995) reported that the total bacteria and gram-negative bacterial population did not change significantly but total

# Environment Conservation Journal

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*Agriculture and the Environment* Kim Sanderson,Environment Council of Alberta,1981 **A Green and Permanent Land** Randal S. Beeman,James A. Pritchard,2001 Once patronized primarily by the counterculture and the health food establishment the organic food industry today is a multi billion dollar business driven by ever growing consumer demand for safe food and greater public awareness of ecological issues Assumed by many to be a recent phenomenon that industry owes much to agricultural innovations that go back to the Dust Bowl era This book explores the roots and branches of alternative agricultural ideas in twentieth century America showing how ecological thought has challenged and changed agricultural theory practice and policy from the 1930s to the present It introduces us to the people and institutions who forged alternatives to industrialized agriculture through a deep concern for the enduring fertility of the soil a passionate commitment to human health and a strong advocacy of economic justice for farmers Randal Beeman and James Pritchard show that agricultural issues were central to the rise of the environmental movement in the United States As family farms failed during the Depression a new kind of agriculture was championed based on the holistic approach taught by the emerging science of ecology Ecology influenced the permanent agriculture movement that advocated such radical concepts as long term land use planning comprehensive soil conservation and organic farming Then in the 1970s sustainable agriculture combined many of these ideas with new concerns about misguided technology and an over consumptive culture to preach a more sensible approach to farming In chronicling the overlooked history of alternative agriculture A Green and Permanent Land records the significant contributions of individuals like Rex Tugwell Hugh Bennett Louis Bromfield Edward Faulkner Russell and Kate Lord Scott and Helen Nearing Robert Rodale Wes Jackson and groups like Friends of the Land and the Practical Farmers of Iowa And by demonstrating how agriculture also remains central to the public interest especially in the face of climatic crises genetically altered crops and questionable uses of pesticides this book puts these issues in historical perspective and offers readers considerable food for thought **Nontimber Forest Products in the United States** Eric T. Jones,Rebecca Jean McLain,James F. Weigand,2002 A quiet revolution is taking place in America s forests Once seen primarily as stands of timber our woodlands are now prized as a rich source of a wide range of commodities from wild mushrooms and maple sugar to hundreds of medicinal plants whose uses have only begun to be fully realized Now as timber harvesting becomes more mechanized and requires less labor the image of the lumberjack is being replaced by that of the forager This book provides the first comprehensive examination of nontimber forest products NTFPs in the United States

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