

# Screening and assessment of microbial isolates of bulk soil and vegetable samples from north-eastern Poland for their potential plant growth promoting traits



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## Introduction

**Plant growth promoting bacteria (PGPB)** is a group of bacteria that helps promote plant growth thanks to their unique properties. PGPB can be used effectively under conditions of nutrient deficiency, thus gradually replacing fertilizers. As phytostimulants, PGPB can increase plant growth and crop yield. These microbes can enhance plant growth through various mechanisms such as production of hormones, mobilization of mineral soil components or VOC production. Some of these bacteria can suppress phytopathogens by producing various metabolites and enzymes such as chitinases, which is referred to biocontrol properties.

## Materials



Cereals cultivation  
(n = 67)



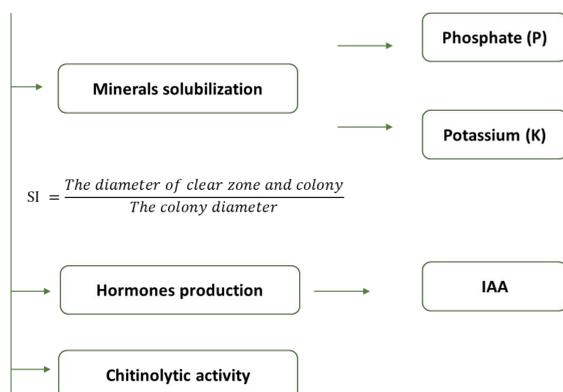
Vegetables cultivations  
(n = 87)

## Methods

Different bacterial strains were isolated from bulk soil (n=114) and vegetables samples (n=40) collected from north-eastern Poland. The analysis of selected PGPB properties was carried out among 154 bacterial isolates, based on: (i) qualitative estimation of phosphorus (P) and potassium (K) solubilization activity, (ii) quantitative estimation of Indole-3-acetic acid (IAA) production. Additionally, the potential chitinolytic properties of the tested isolates were preliminarily established by qualitative test. Moreover, quantitative estimation of potassium solubilization after one, three and five days of incubation for the isolates, which exhibited the biggest activity was done. IAA production was estimated after one, three and five days of incubation only for selected isolates with the highest results.

## Results

### Screening of growth promoting traits



Results
66.8% 20% > 2.0
63.2% 46% > 2.0
85.5% 74% > 20 µg/ml
10% 90% > 2.0



Solubilization activity



Auxin production

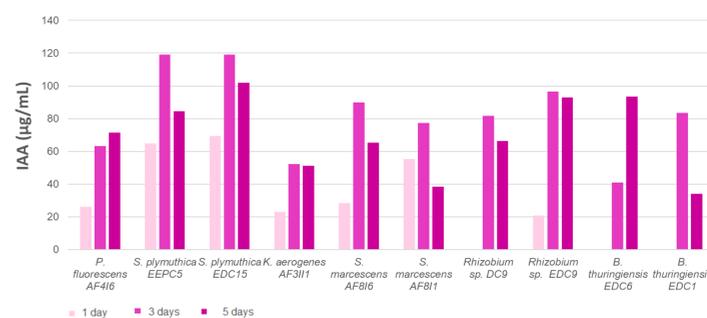


Fig.2. IAA production by selected isolates (n=10).

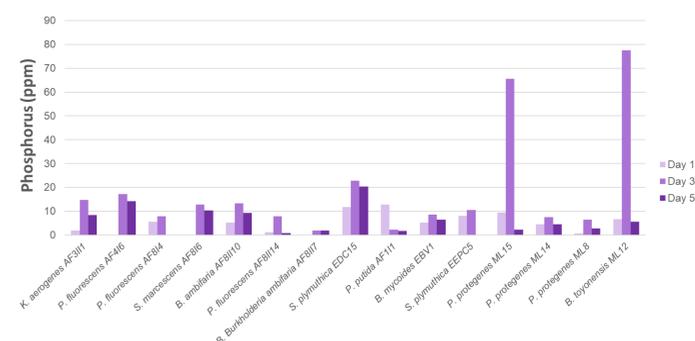


Fig.3. IAA production by selected isolates (n=15).

Fig.1. Preliminary screening and assessment of isolates (n=154) for their potential plant growth promoting traits (P and K solubilization; IAA production and chitinolytic activity).

## Results and Conclusions

Of 154 soil isolates, 67% and 63% were capable of phosphate and potassium solubilization, respectively. Nearly 20% and 46%, respectively, showed a solubilization index of more than 2.0. Only 15% of the tested isolates were not able to produce IAA. As many as 74% of all isolates were able to synthesize this hormone in concentration above 20 µg/ml. Only 10% of the tested isolates showed the ability to decompose colloidal chitin.

**Conclusions:** IAA production, phosphate and potassium solubilization are common properties among tested environmental isolates from north-eastern Poland. High results obtained for selected strains may indicate that among tested bacteria are those that will positively affect plant growth. Isolates that showed the ability to decompose colloidal chitin remain in the minority, and they are potential candidates as natural biocontrol agents.