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Hydrogen Cyanide Production Ability by *Pseudomonas fluorescens* Bacteria and their Inhibition Potential on Weed Germination

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Abstract

This research was undertaken to isolate and purificate indigenous *Pseudomonas* spp., to evaluate its ability in hydrogen cyanide synthesis and also to evaluate the potential of super-strains on seedling growth inhibition of weeds. The research was carried out in laboratory tests. 136 strains (obtained from rhizosphere soil of 62 weed species) and 27 strains of *Pseudomonas fluorescens* were sub-cultured, purified and refreshed. Then these strains were evaluated for the capability in cyanide synthesis and at last 4 super-strains of cyanogenic *Pseudomonas* were selected and used in further experiments. The effects of these strains on stem length, root length and stem length/root length rate in rye, wild barley, and wheat were evaluated in three different *in vitro* tests examining the effects of gas and liquid metabolites produced by the bacteria.

The results showed that the abundance and probability of the bacteria isolation was low (about 3.6%). About 37% of *Pseudomonas* were capable of HCN production and this capacity was different among the strains. Gas metabolites reduced more than 90% of root and shoot growth in weeds. These gas metabolites had larger inhibitory effects than other metabolites on plants. However, these influences were different in every bacteria treatment. Also wheat had less growth reduction if compared to weeds, indicating that the bacteria are probably plant specific.

In conclusion, the results proved that cyanogenic *P. fluorescens* had the potential of biological weed control. However, further studies on its application under natural conditions like greenhouse and field conditions, seem to be necessary.

Keywords: Biological weed control, growth inhibition, hydrogen cyanide, *Pseudomonas* spp., weeds