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## Implications of Using Allelopathic Bacteria for Control of Weeds Associated with Wheat (*Triticum aestivum* L)

ZAHIR A. ZAHIR<sup>1</sup>, TASAWAR ABBAS<sup>2</sup>, MUHAMMAD NAVEED<sup>3</sup>

<sup>1</sup>University of Agriculture, Institute of Soil & Environmental Sciences, Pakistan

<sup>2</sup>Pesticide Residue Lab, Kalashah Kaku,

<sup>3</sup>University of Agriculture Faisalabad, Institute of Soil & Environmental Sciences, Pakistan

### Abstract

Human activities in nature have diversified pests which now pose more threats in crop production in spite of intense pest control practices. Growth of weeds causes more losses to crops than other pests worldwide. Non-chemical approaches of weed control based on use of allelopathic bacteria should be adopted in order to avoid diversification of weeds and harmful effects of herbicides on human health, ecology and environment. Allelopathic bacteria are root inhabiting bacteria which suppress growth of certain weeds by producing phyto-toxic substances in a host specific manner. In the present study, rhizosphere inhabiting bacteria of weeds and infested wheat were isolated and characterised for production of phyto-toxic substances. Nineteen of several hundred strains were found promising and tested on wheat and 4 weeds of wheat under axenic conditions. The results indicated selective and non-selective inhibition of these weeds and either inhibitory or non-inhibitory (even promotory) effects on wheat. Ten of these strains were re-tested on 3 weeds and wheat under similar conditions which supported the results of previous studies. These strains inhibited the germination and/or growth of their respective weeds while being non-inhibitory to wheat. Four of these strains promoted the growth of wheat. Five efficient strains from the laboratory studies were evaluated to control these weeds under field conditions at 3 sites. Infestations of weeds caused losses in grain yield to wheat up to 54.1, 53.9 and 56.3% in these field trials. Suppression of weeds by the 4 of 5 strains of allelopathic bacteria controlled these losses in grain yield of infested wheat from 38.3 to 62.9 and 34.3 to 64.3% in field trial I and II, respectively. These 5 strains controlled loss in grain yield of infested wheat from 29.0 to 60.7% in field trial III. Two of these strains promoted growth and yield of wheat under weed free conditions while others remained non-inhibitory. Biochemical characterisation of these allelopathic bacteria also confirmed the possession of plant growth promoting characteristics by these 2 strains. This work suggests adoption of allelopathic bacteria for successful control of weeds in wheat as a novel environment friendly approach.

**Keywords:** Allelopathic bacteria, weeds, wheat