PREFACE

Since the dawn of civilization on planet earth, agriculture has been considered the most important resource for maintenance of livelihood of the mankind/ financial source of the mankind. Therefore, the dynamic soil nature of crop field is the main focus/for sustainable agriculture. In India more than 60% of its land is used for agriculture to cultivate several types of vegetables, cereals, pulses, oilseeds, fruits etc. Organic carbon content, moisture contents, minerals like, phosphorus, nitrogen, potassium, and other different biotic and abiotic factors are important which regulates the soil quality for crop production. However, the soil pH and exchangeable bases are reduced and soil nutrients become unavailable to crops due to the indiscriminate use of chemical fertilizers, especially nitrogen and phosphorus fertilizers. As the agricultural land quantity is limited and world population is increasing at an alarming rate, which in turn is generating tremendous pressure for the overproduction of edible crops. Hence, to fulfil the increasing food demand through maintaining the soil fertility is highly warranted, which urgently require improved scientific farming techniques. Genetically engineered crops, agricultural intensification, sustainable management practices, use of genetically modified microbes in the crop field and use of biofertilizers are some of the current techniques that are being used for sustainable agriculture. The desired goal can also be fulfilled by the use of soil microorganisms, such as fungi, algae and bacteria which can promote plant growth. Association of microbes to the plants can be best described by plant growth promoting rhizobacteria (PGPR), which by various synergistic mechanism help not only to induce plant growth but also give protection to the host plant from pathogens. For conversion of barren poor-quality land into fertile cultivable land, PGPR plays crucial role. The research work presented herein describe the effect of PGPR supplementation to the NF with varying input of N on plant performance. For achieving the objective, the mustard plants were treated with the NF having differential N inputs and two PGPR isolates *C. davisae* RS3 and *K. pneumoniae* RS26, employing both the general and statistical approaches and their effect on plant growth and yield were compared by monitoring morphological and biochemical parameters, and seed yield. The plants under NF treatment regime showing highest growth and yield was subjected to differential transcriptomics analysis using plants treated with optimum level of inorganic N as control.