



Isolation of *Klebsiella sp* from Medical garbage Soil and its Effect in Growth of Chickpea Plant

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Abstract : The genus *Klebsiella* belongs to a member of Enterobacteriaceae. It found in normal flora of the mouth. It can cause destructive changes to respiratory tract especially to alveoli results in blood spectrum. The *Klebsiella* is naturally occurs in soil which can fix nitrogen in anaerobic conditions. This Enterobacteriaceae was isolated from medical garbage soil and screening by biochemical tests. The isolated *Klebsiella sp* was used as inoculants for growth of chick pea plants. The maximum growth was observed in 1ml treated soilbut high concentration inhibited the growth.

Keywords: *Klebsiella sp*, Medical garbage Soil, Chickpea Plant.

Introduction

Klebsiella spp. is considered as one of most common human pathogens. *Klebsiella* is a Non-motile, Gram-negative, rod-shaped bacteria with a well developed polysaccharide-based capsule. *Klebsiella* species are found in nature. This is due to specific lineages developing unique niche adaptations, with associated with environmental and biochemical changes which make them better fitted to a particular environment. They can be found in water, soil, plants, insects, animals and humans¹.

Klebsiella species can cause severe infections that include meningitis, bronchitis, bacteremia, pneumonia, urinary tract infections in humans and animals² *Klebsiella* is behaved like *Enterobacter* and *Citrobacter* but *Shigella spp.* or *E. coli*, which are common in humans but not in the environment. This bacterium can attach strongly bind to root hairs and less bind to the surface of the zone of elongation and the root cap mucilage³. These bacteria are environment friendly bacterium in agricultural fields. This bacteria can fix atmospheric Nitrogen and stimulate the crop yields⁴. The relationship between nitrate reduction and nitrogen assimilation were carried out by both *K. pneumoniae* and *K. oxytoca*⁵.

The plant growth in this bacterium is due to the nitrogen fixation and it reduces plants defense. The plants are grown at the various stages with support of cow dung as a fertilizer. The plant promoting *Klebsiella spp* act as sources of natural auxins which stimulate the formation of nodule-like structures on non-legumes is probably of interest in agriculture^{6,7}.

Drug-resistant isolates are found in hospital-acquired bacterial pathogen, are especially problematic in high-impact medical areas such as intensive care units^{8,9}. This antimicrobial resistance is thought to be attributable mainly to multidrug efflux pumps. The ability of *K. pneumoniae* to colonize in the hospital environment, including carpeting, sinks, floors, and various surfaces, as well as the skin of patients and hospital staff has been identified as a major factor in the spread of hospital-acquired infections¹⁰.

Moreover, *K. pneumoniae* is a common hospital-acquired pathogen that frequently causes nosocomial outbreaks. It can produce the symptoms of urinary tract, respiratory tract, soft tissue infections and liver abscess syndrome^{11,12,13}. The multi drug resistance bacteria of *Pseudomonas* was also found in expired tablets¹⁴

Materials And Methods

Soil sample was collected near the garbage of hospital .The soil sample was diluted by serial dilution method, followed by spread plate method using nutrient agar medium. The morphological characteristics of microbes were identified by gram's staining and motility test. The isolated organism was further confirmed by keeping in Mac conkeyagar, Cetrimide agar and Simmons citrate medium. The various biochemical tests of triple sugar iron agar, oxidase, catalase, indole and VP tests for screening of microbes specifically.

K. pneumoniae isolates were sub-cultured three times in Luria broth (LB) for 18 h at 37 °C according to Kwasny and Opperman and carried out In Vitro Biofilm Formation Assay^{15,16}. The isolated bacterial colonies were used as inoculants for growth of chick pea plants. The plant growth was expressed in terms of height and its nitrogen content was measured by Kjeldhal method.

Results and Discussion

The most important task is the isolation of microbes from garbage soil. The cultivation of microbes was carried out in nutrient agar by serial dilution followed by spread plate technique. This helps to ensure the isolated colonies. The gram negative bacteria were determined by gram staining method. Pink color rod shaped bacteria was observed.

Specific culture medium showed characteristics of Enterobacteriaceae. The isolated colonies were grown on Mac Conkey agar. The button mucoid formation was observed on the agar plate. This confirmed the presence of *Klebsiella*. This was further screened by various biochemical tests. The biochemical tests showed negative results for Methyl red and indole. The *Klebsiella* showed positive results for voges – proskauer citrate and triple sugar test (Table1). *Klebsiella* was also exhibit biofilm formations(Fig1).



Fig 1:Biofilm of *Klebsiella* spp

Table1: Biochemical test for *Klebsiella* spp

Biochemical test	Results
Methyl red test	Negative
Indole test	Negative
Vogesproskauer Test	Positive
Citrate test	Positive
Triple sugar test	Positive

The isolated pathogenic bacteria can fix N₂ for chick pea plants with soil in different proportion used as inoculants for growth of plants. The maximum growth of plants was observed in 1000µl of inoculum treated

soil(Fig 2). High concentration of inoculants (10ml) inhibited the growth of plants. Nitrogen content of leaves were gradually increased and attained maximum height upto certain level of iml inoculants treated soil. High concentration suppressed the growth in terms of plant height and retarded growth.

Conclusion

The dumping of medical waste in hospitals and surrounding areal may have unintended effects on animals and microorganisms in the environment. It also contaminates the ground water., *Klebsiellaa* multidrug resistance bacteria was observed and causes respiratory and urinary tract infection.. There are many ways of safety disposals of pharmaceuticals such as return to the donor or manufacturer, encapsulation, sewer, burning in the open container, medium temperature incineration, novel high temperature incineration, chemical decomposition. These kinds of safety disposals will save the lives of microorganisms as well as the environment.

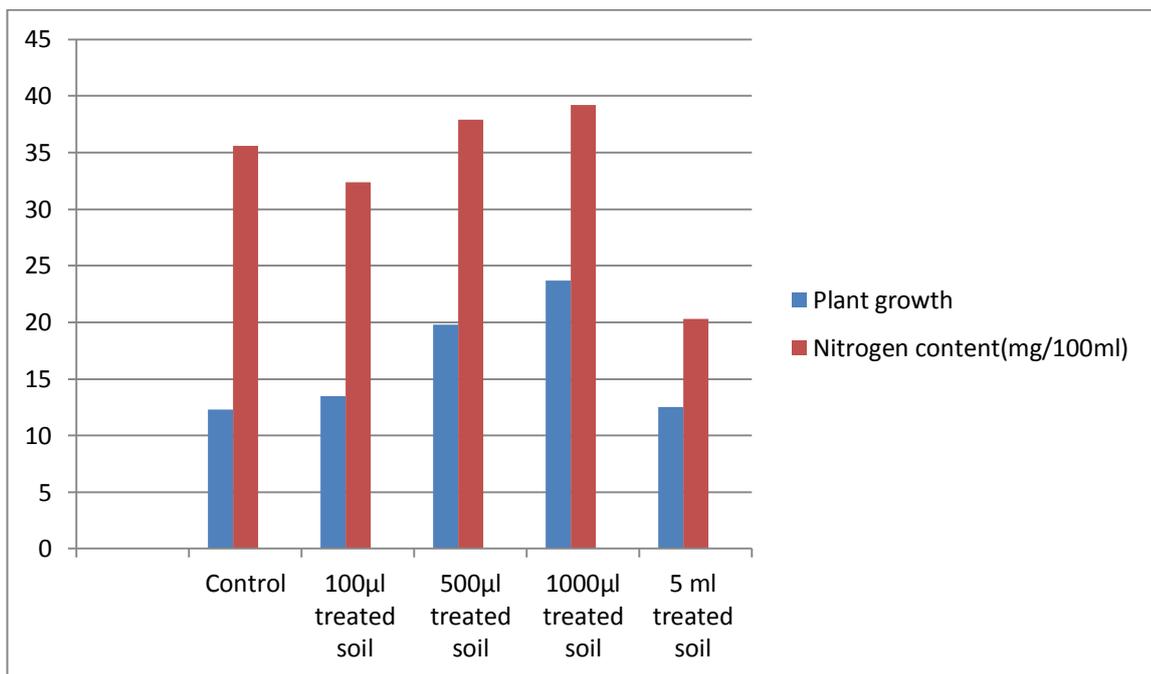


Figure 2: Effect of isolated bioinoculants for the yield of chick pea

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