5. SUMMARY
Phosphorus is an essential and major nutrient for microorganisms and plants. Phosphorus influences plant growth and productivity throughout the world. Also it is an essential component of DNA and RNA in biological systems. Since most of the compounds of phosphorus occurring in nature especially in soils are insoluble, microorganisms, in particular, rhizobacteria play a significant role in the solubilization of these compounds. Hence the present study on phosphate-solubilizing bacteria in the rhizosphere of foxtail millet is essentially concerned with the following aspects:

- Isolation and enumeration of populations of phosphate-solubilizing bacteria from the rhizosphere and non-rhizosphere soil samples of foxtail millet.
- Purification and identification of the representative isolates.
- Estimation of the extent of solubilization by the different isolates of the phosphate-solubilizing bacteria.

Populations of phosphate-solubilizing bacteria in the rhizosphere and non-rhizosphere soil samples

Data revealed that non-rhizosphere samples of black and red soils harboured considerable populations of phosphate-solubilizing bacteria. The populations of phosphate-solubilizing bacteria increased gradually from 30 to 60 days and declined at 75 days in black and red soils. Black soil harboured higher populations of phosphate-solubilizing bacteria in Kharif season when compared to Rabi season. In contrast, red soil harboured higher populations of phosphate-solubilizing bacteria in Rabi season than in Kharif season. Data obtained from the non-rhizosphere samples indicate that the populations of phosphate-solubilizing bacteria varied depending on the soil type and the season. Results indicated that the rhizosphere samples of all the three varieties possessed...
significantly higher populations of phosphate-solubilizing bacteria when compared to the corresponding non-rhizosphere soil samples. The populations of phosphate-solubilizing bacteria increased from 30 to 45 days in the rhizosphere soil samples of Lepalshi and Prasad varieties and declined on 60 and 75 days in both the seasons planted to black and red soils while the populations of phosphate-solubilizing bacteria increased from 30 to 60 days and decreased at 75 days in the rhizosphere samples of Chitra variety in both Rabi and Kharif seasons planted to black and red soils. The populations of phosphate-solubilizing bacteria in the non-rhizosphere and the rhizosphere samples of the three varieties planted to black soil were higher than the populations of phosphate-solubilizing bacteria in the non-rhizosphere and rhizosphere samples planted to red soil. The populations of phosphate-solubilizing bacteria in the non-rhizosphere and rhizosphere samples of the three varieties were higher in Rabi season when compared to the populations of phosphate-solubilizing bacteria in the non-rhizosphere and the rhizosphere samples of Kharif season.

In general, the populations of phosphate-solubilizing bacteria in the rhizosphere samples of Lepalshi were higher when compared to the other two varieties viz., Chitra and Prasad in both soils and seasons. Higher populations of phosphate-solubilizing bacteria in the rhizosphere samples of Prasad variety planted to black soil in Rabi season were observed when compared to Chitra variety. The populations of phosphate-solubilizing bacteria in the rhizosphere samples of Chitra variety planted to red soil in Rabi season were slightly more when compared to Prasad variety. On the contrary, Prasad variety harboured marginally higher populations of phosphate-solubilizing bacteria in Kharif season planted to black soil than Chitra variety while phosphate-
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solubilizing bacterial populations in their rhizosphere samples planted to black and red soils in Kharif season were at par.

**Solubilization of phosphate by phosphate-solubilizing bacteria isolates**

The non-rhizosphere soil samples of black and red soils harboured phosphate-solubilizing bacterial isolates with medium and high level solubilization in Rabi and Kharif seasons. However, the non-rhizosphere samples did not possess phosphate-solubilizing bacterial isolates with either low or very high efficiency. The rhizosphere samples of the three varieties possessed phosphate-solubilizing bacterial isolates with medium, high and very high efficiency except for the phosphate-solubilizing bacterial isolates in Kharif season which lacked very high efficiency. All the three varieties did not exhibit phosphate-solubilizing bacterial isolates with low efficiency except for Lepakshi variety planted to red soil in Kharif season.

The phosphate-solubilizing bacterial isolates of rhizosphere samples with very high efficiency were more in Lepakshi variety planted to black soil when compared to Chitra and Prasad varieties. All the three varieties possessed phosphate-solubilizing bacterial isolates with high efficiency almost at the same level. The phosphate-solubilizing bacterial isolates of Chitra and Lepakshi varieties with medium efficiency were almost equal while the rhizosphere samples of Prasad variety harboured higher number of phosphate-solubilizing bacterial isolates.

The rhizosphere samples of both Lepakshi and Prasad varieties planted to red soil harboured an equal number of phosphate-solubilizing bacterial isolates with medium efficiency while Chitra variety possessed less number of phosphate-solubilizing bacterial...
isolates. The number of phosphate-solubilizing bacterial isolates with high efficiency were almost the same in all the three varieties. None of the phosphate-solubilizing bacterial isolates of Lepakshi variety planted to red soil possessed very high efficiency while maximum number of phosphate-solubilizing bacterial isolates with very high efficiency were recorded in Chitra variety followed by Prasad variety.

The number of phosphate-solubilizing bacterial isolates with medium efficiency in the rhizosphere samples of Prasad in Rabi season was higher when compared to Lepakshi and Chitra varieties. All the varieties possessed almost the same number of phosphate-solubilizing bacterial isolates with high efficiency. The phosphate-solubilizing bacterial isolates with very high level efficiency were more in Chitra variety followed by Lepakshi and Prasad varieties.

The number of phosphate-solubilizing bacterial isolates with medium efficiency in the rhizosphere samples of Chitra and Lepakshi was almost at par whereas Prasad variety recorded higher number of such phosphate-solubilizing bacterial isolates. The number of phosphate-solubilizing bacterial isolates with high efficiency was equal in the rhizosphere samples of Lepakshi and Prasad varieties while the rhizosphere samples of Chitra variety had slightly higher number of the isolates. Maximum number of phosphate-solubilizing bacterial isolates with very high solubilization occurred in the rhizosphere samples of Chitra variety followed by Lepakshi and Prasad varieties.

The salient features of the present study on phosphate-solubilizing bacteria in the rhizosphere of foxtail millet are:
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- Rhizosphere samples of all the varieties of foxtail millet harboured higher populations of phosphate-solubilizing bacteria when compared to the non-rhizosphere samples.

- Populations of phosphate-solubilizing bacteria increased marginally from 30 to 45 days in the rhizosphere samples of Lepakshi and Prasad while the populations of phosphate-solubilizing bacteria increased from 30 to 60 days in case of Chitra variety.

- Lepakshi variety harboured higher populations of phosphate-solubilizing bacteria in the rhizosphere samples when compared to Chitra and Prasad varieties.

- Non-rhizosphere and rhizosphere samples of black soil in general had higher populations of phosphate-solubilizing bacteria than the populations of phosphate-solubilizing bacteria in red soil.

- The populations of phosphate-solubilizing bacteria were more in the non-rhizosphere and the rhizosphere samples in Rabi season when compared to Kharif season.

- Non-rhizosphere samples did not possess phosphate-solubilizing bacterial isolates with either low or very high efficiency.

- Isolates of phosphate-solubilizing bacteria from the rhizosphere samples were more efficient in solubilization when compared to the isolates from the non-rhizosphere samples.

- Phosphate-solubilizing bacterial isolates from black soil were more efficient in solubilization of phosphate when compared to the phosphate-solubilizing bacterial isolates from red soil.

- All the varieties harboured the same number of phosphate-solubilizing bacterial isolates with high efficiency in both the seasons.

- Very high efficient phosphate-solubilizing bacterial isolates occurred in the rhizosphere samples of all the varieties in Rabi season only but not in Kharif season.

- Very high efficient phosphate-solubilizing bacteria were more numerous in the rhizosphere samples of Chitra variety followed by Lepakshi and Prasad varieties.

- The percentage of occurrence of phosphate-solubilizing bacterial isolates with different solubilization rates followed the order: medium (63.28) > high (23.44) > very high (12.50) > low (0.78).