

Effective compaction method for utilizing low quality banking material for railway embankment

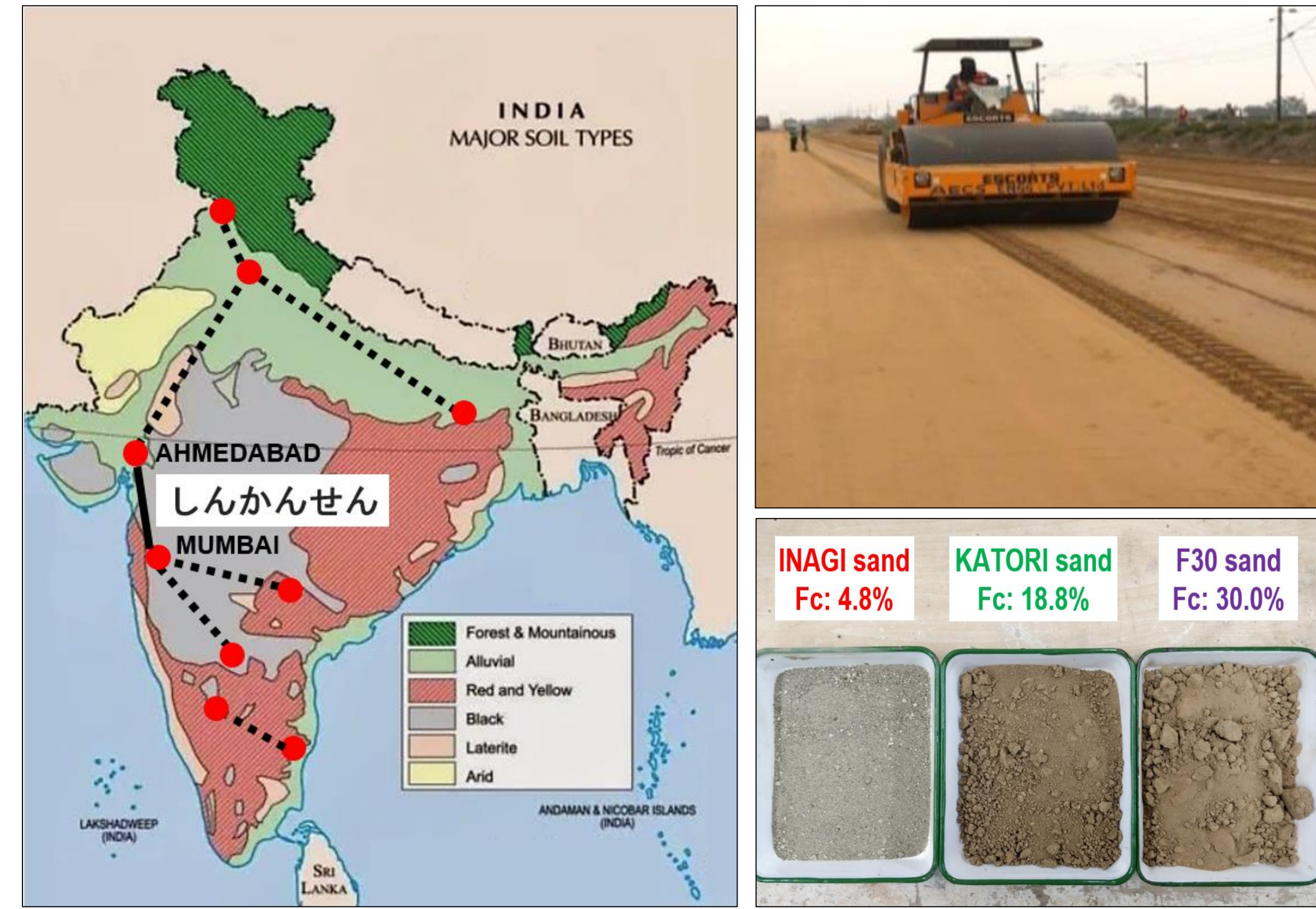
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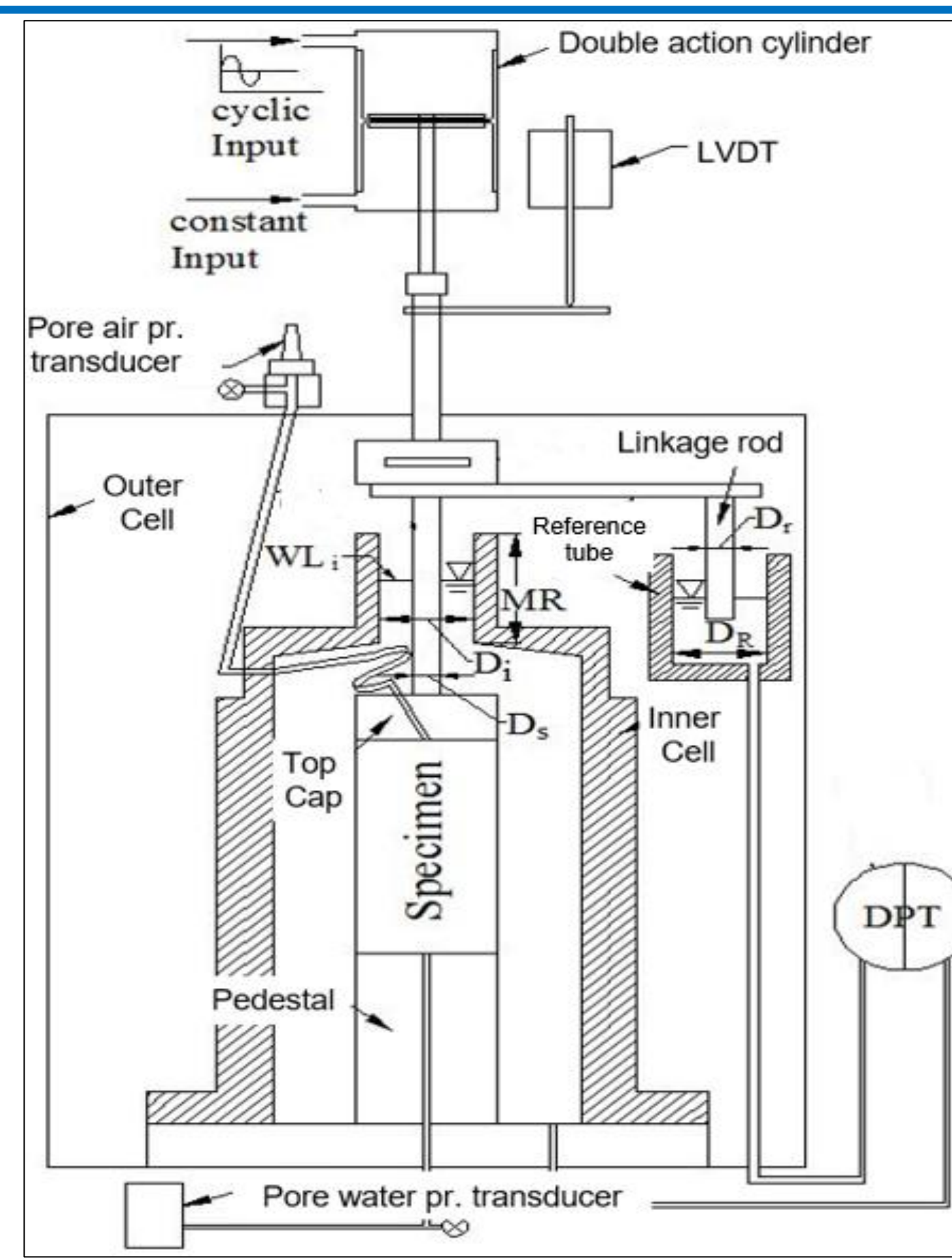
Introduction

- Indian Railways have planned construction of many high-speed rail projects in near future. An earth embankment is the cheapest railway structure and for its construction, a good quality soil having low fines content ($F_c\%$) is the most important requirement, so that the railway embankment exhibits minimum deformation during its design life. As per the geology of India, the availability of good quality soil is low.
- In this research, an effort has been made to utilize a slightly lower quality soil having more fines content, in a railway embankment by doing better compaction. The importance of moisture control in an embankment is also studied.



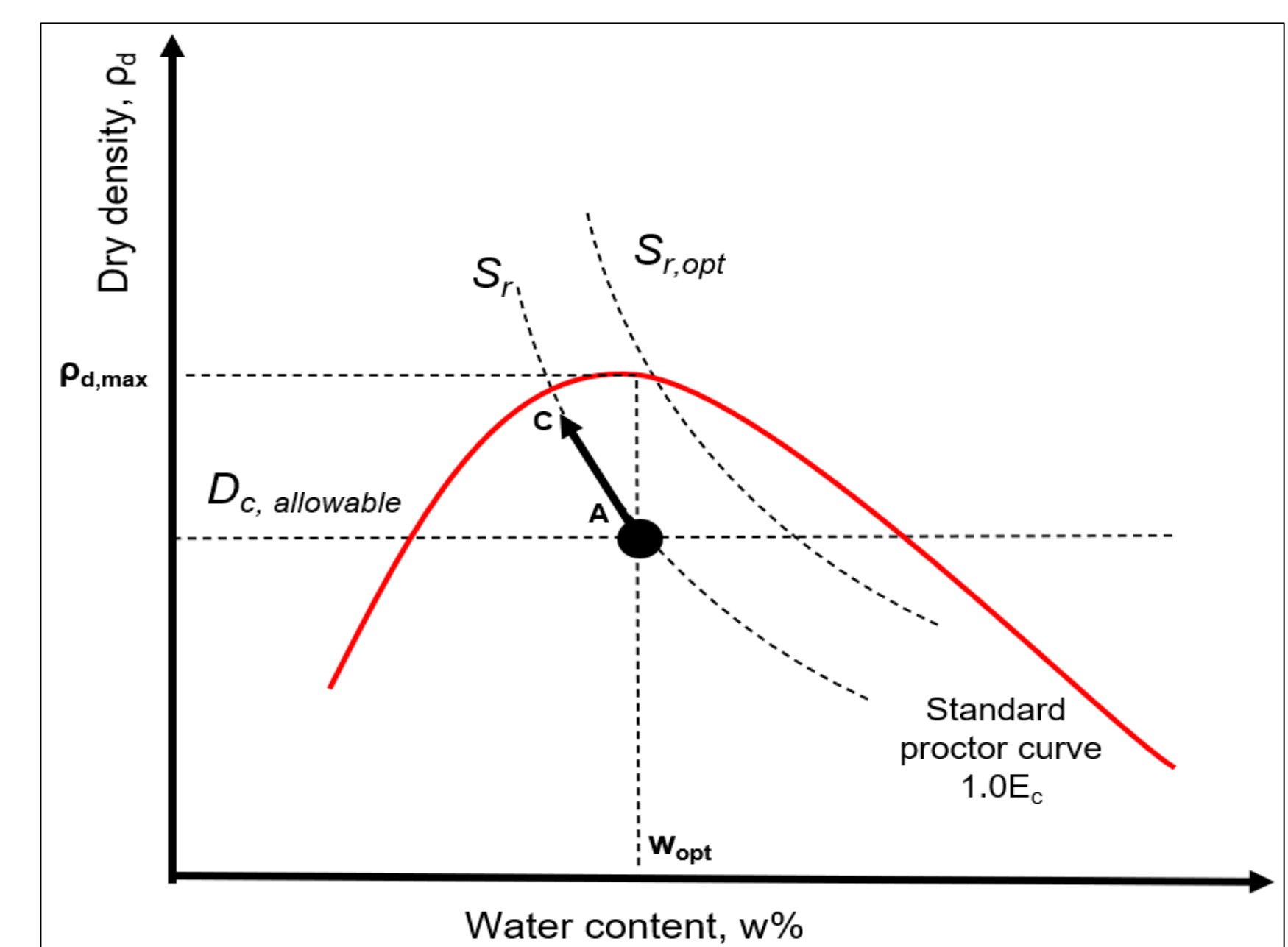
Methodology

- Special apparatus called the Linkage double cell triaxial apparatus capable of unsaturated soil testing was used.
- Inagi sand ($F_c: 4.8\%$), Katori sand ($F_c: 18.8\%$) and F30 sand (finer version of Katori sand with $F_c: 30.0\%$) were tested under cyclic compressive loading.



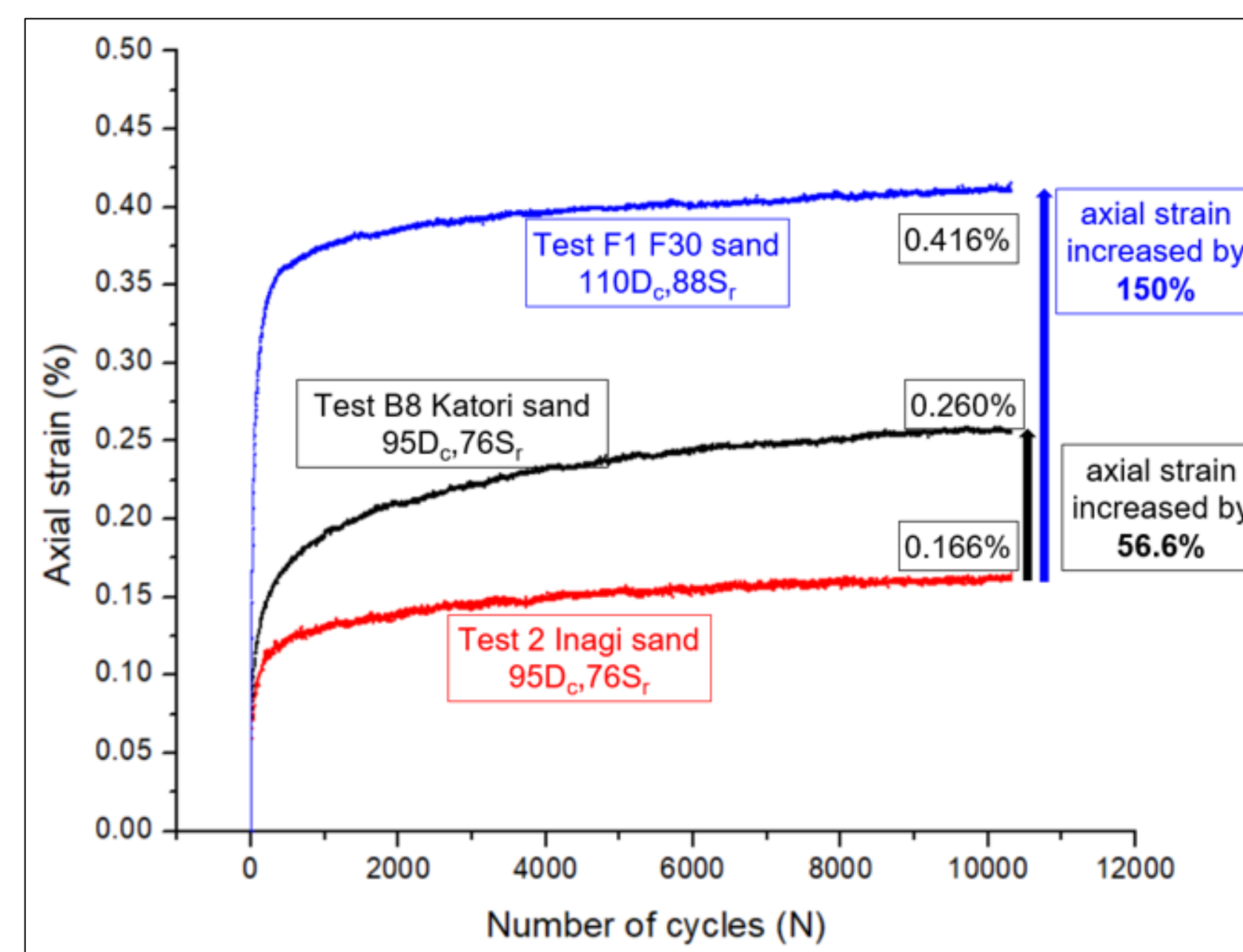
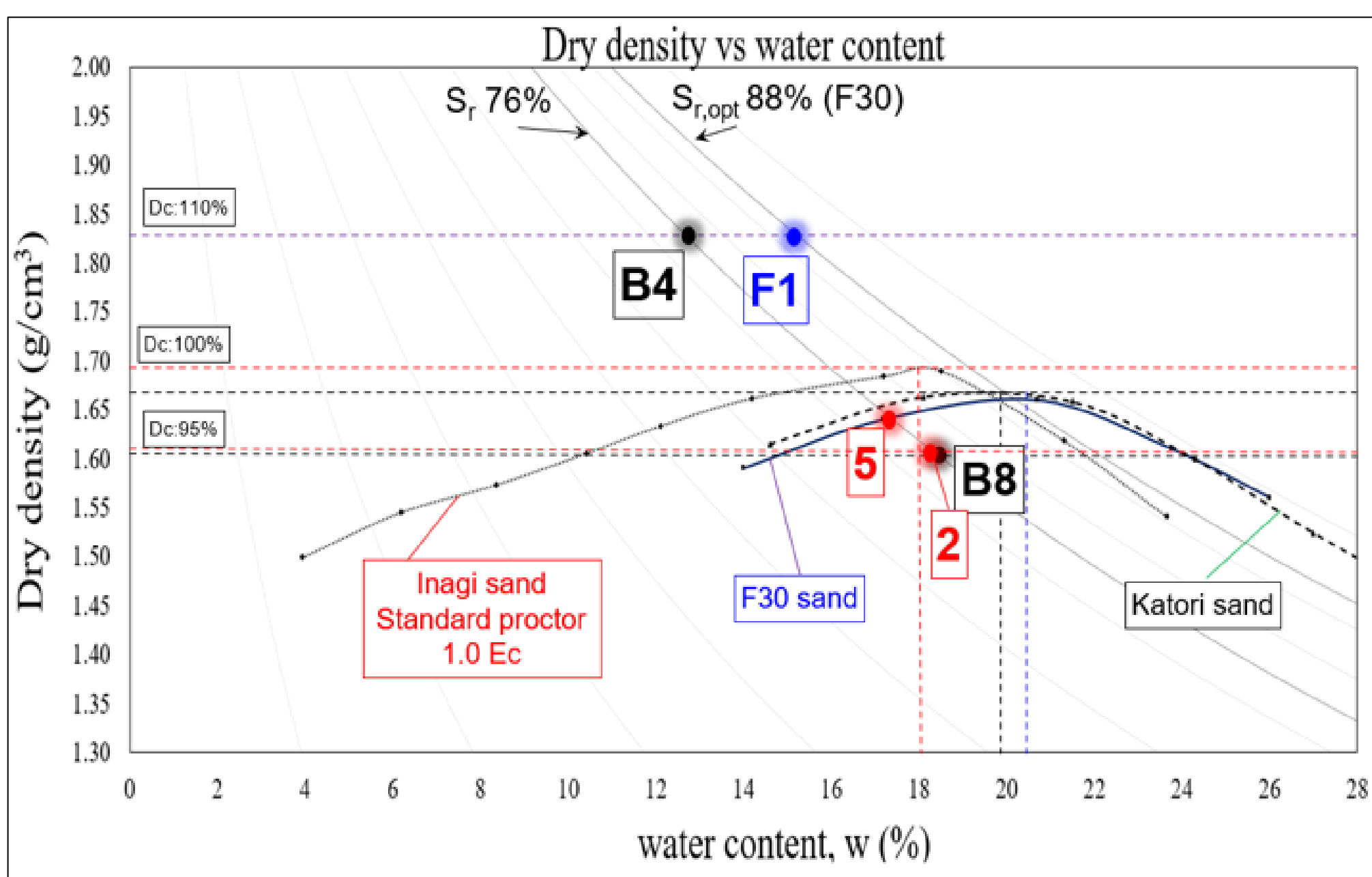
Saturation degree (S_r) for moisture control

- Compaction of lower quality soils by using Saturation degree (S_r) for moisture control is an important index for effective compaction.

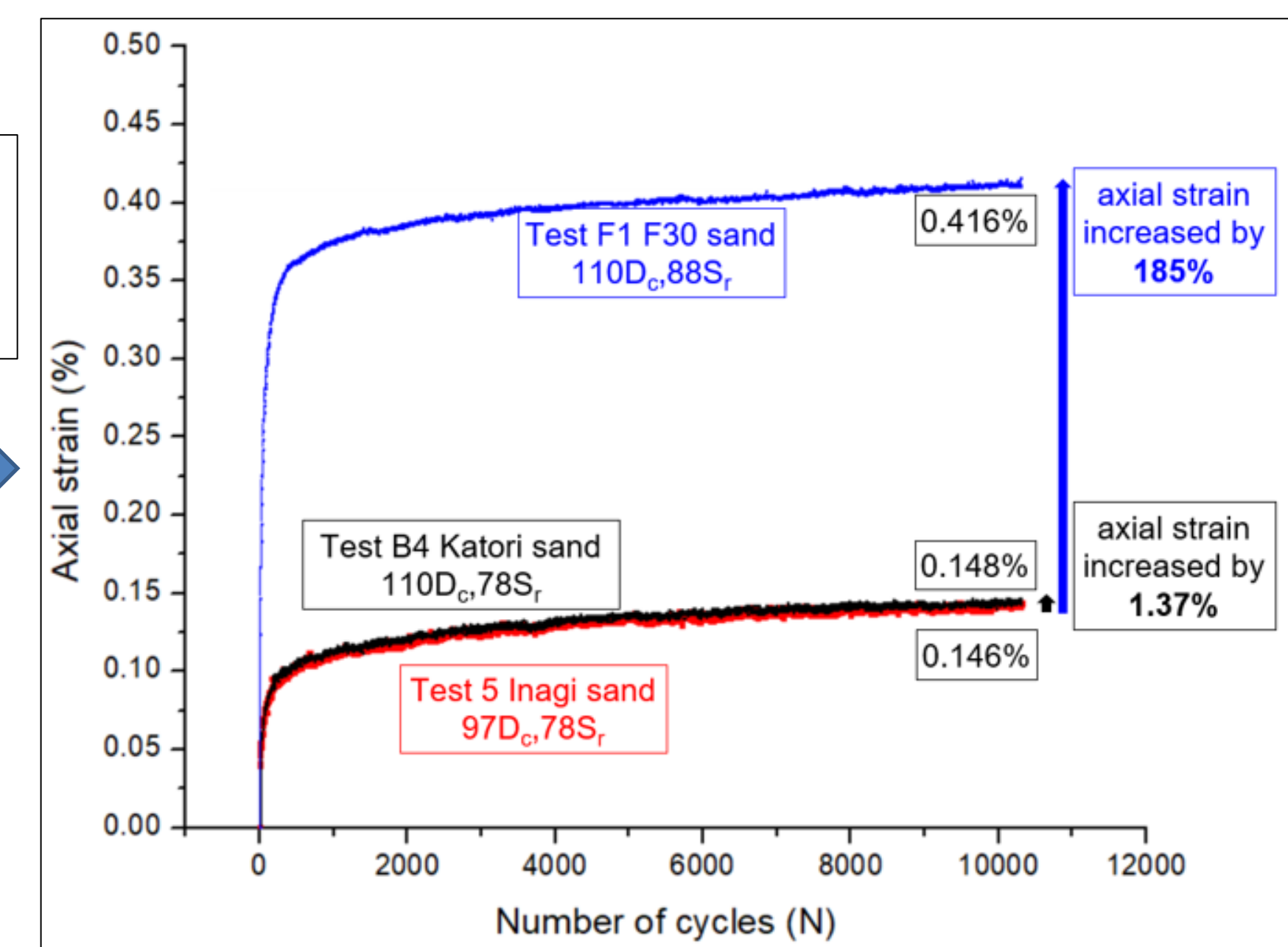


Effect of better compaction on lower quality soil

At similar compaction level for all soils, the accumulated axial strain is lowest for good quality Inagi sand, but with better compaction of lower quality soils, Katori sand with 18.8% fines performed similar to Inagi sand. However, F30 sand with 30% fines could not perform even with better compaction.



With Better compaction



Importance of moisture control in compacted soil

Soil samples compacted in dry conditions under low saturation degree show highest stiffness, still their performance in terms of lower deformation is not better. Such soils may satisfy the compaction parameters but may pose a potential risk of more deformation in future.

