

Determining the resilient moduli of HRB stabilized soils by the cyclic CBR method

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Why

- Forest roads need economic and durable pavements
- Analytic pavement design became accessible
- Elastic material properties – M_r – needed
- Standard method is expensive
- Calculation from static properties is inaccurate

Standard method is expensive

CBR test machine

3.500€

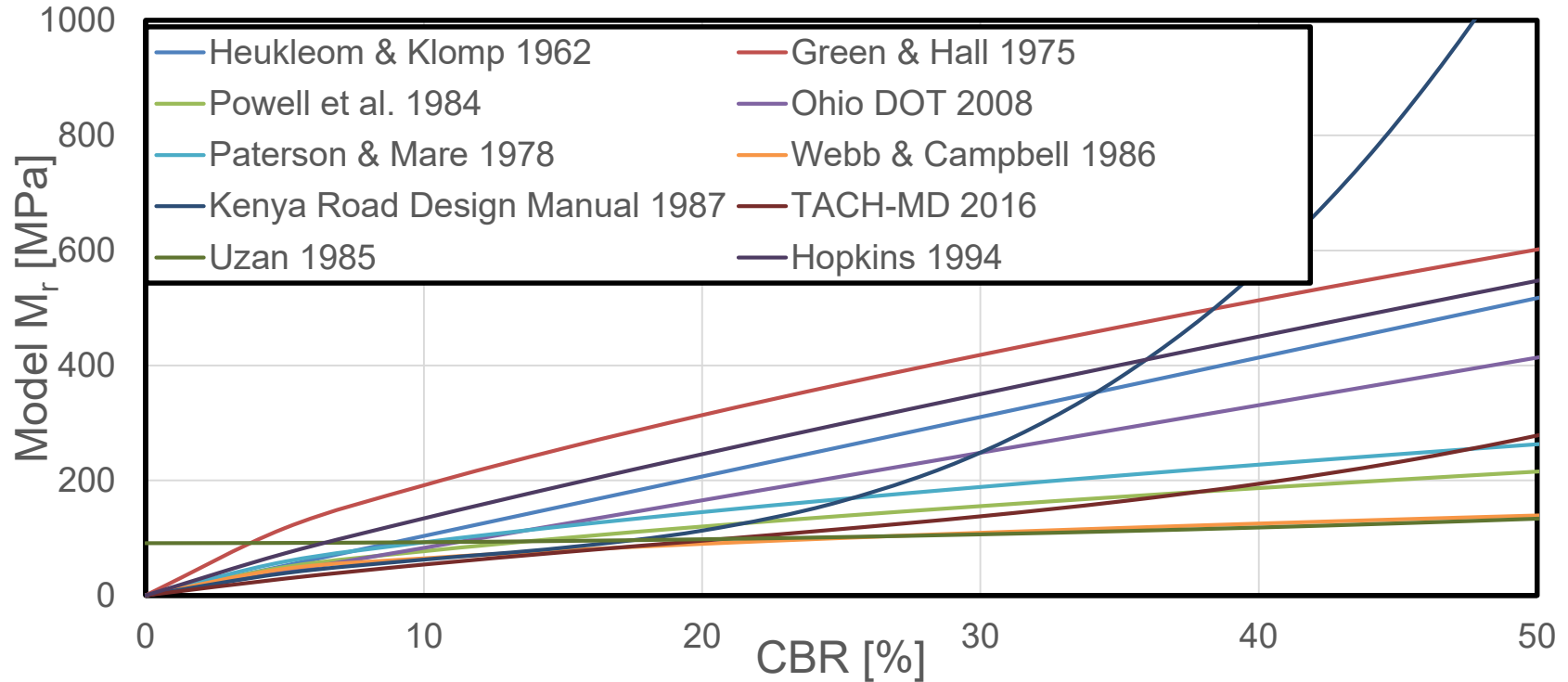


Triaxial test machine

45.000€



Converting CBR to M_r is inaccurate



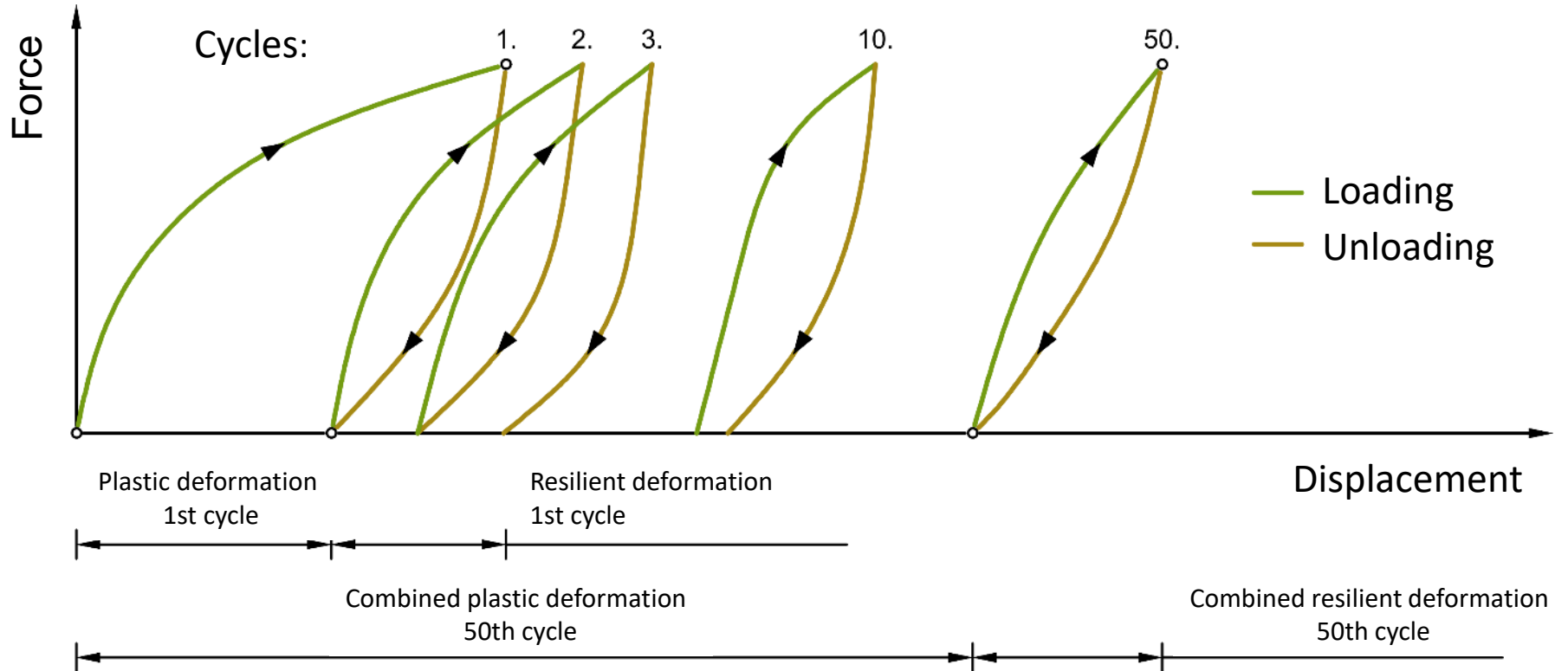
Aim

Resilient modulus (M_r) from simple measurements

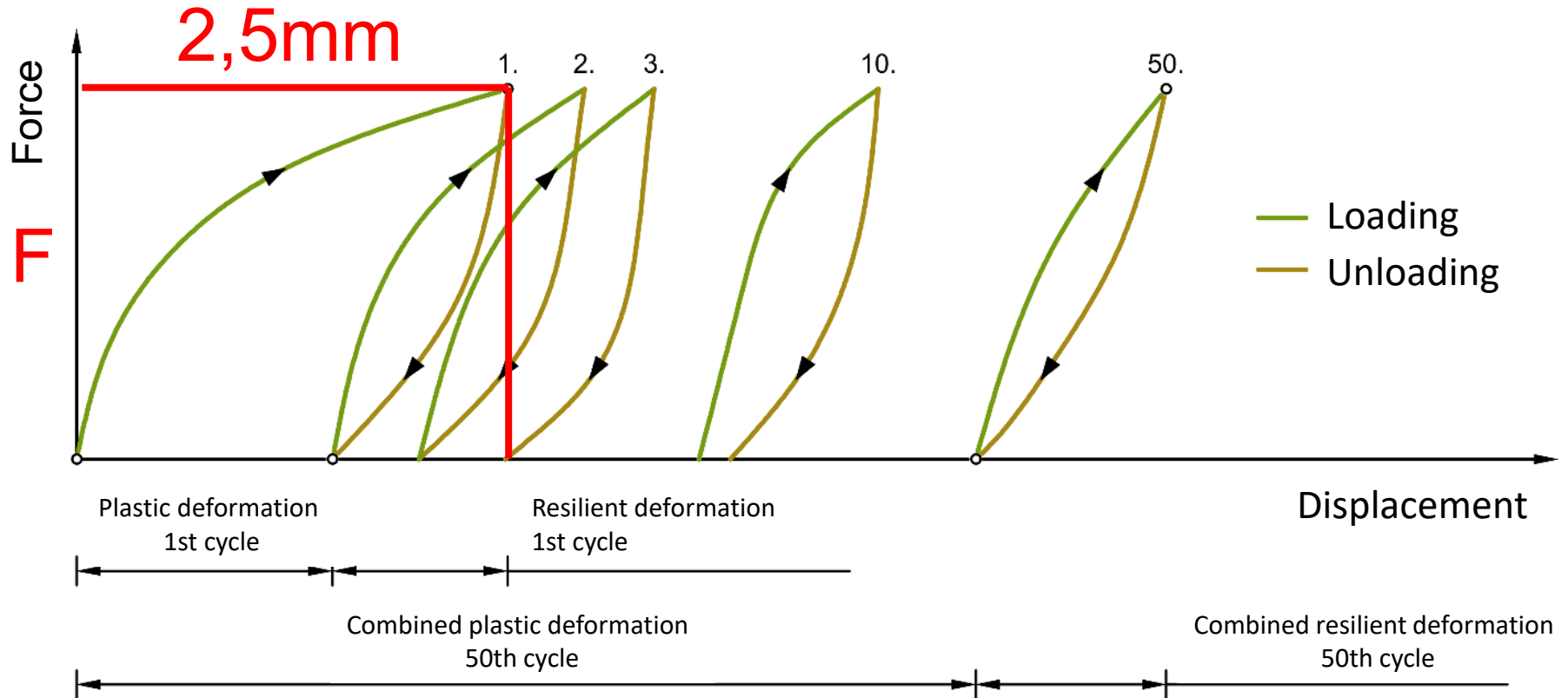
Cyclic CBR test



Cyclic CBR test



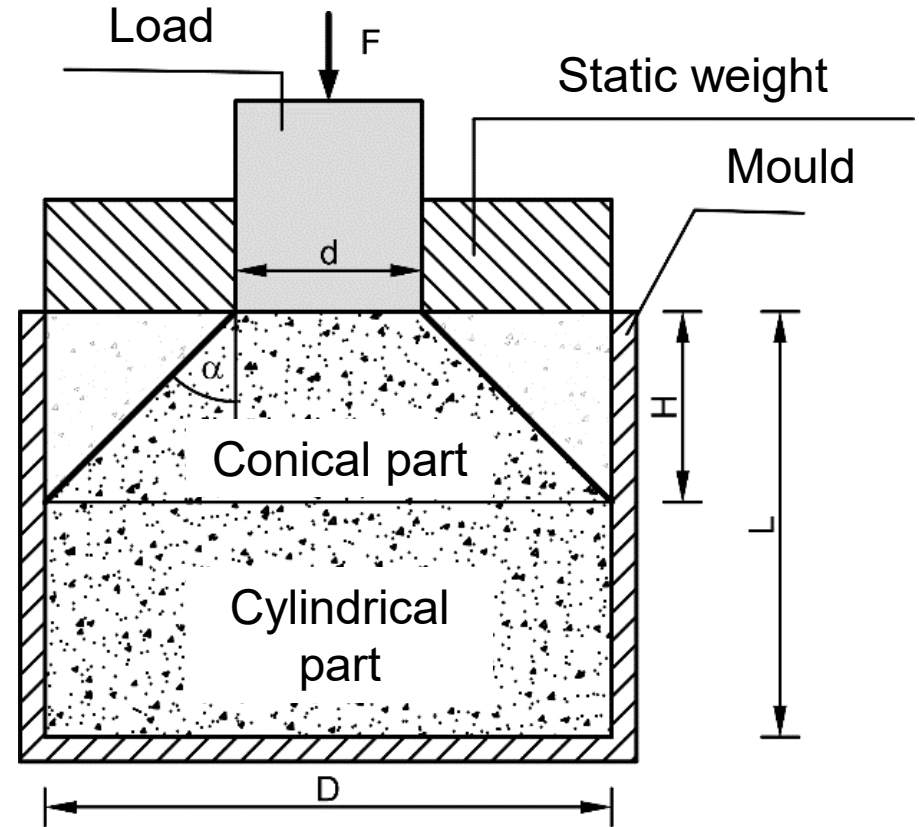
Cyclic CBR test



cCBR \rightarrow M_r

$$M_r = \frac{\sigma d}{u d} \left[H + \frac{d(L - H)}{D} \right]$$

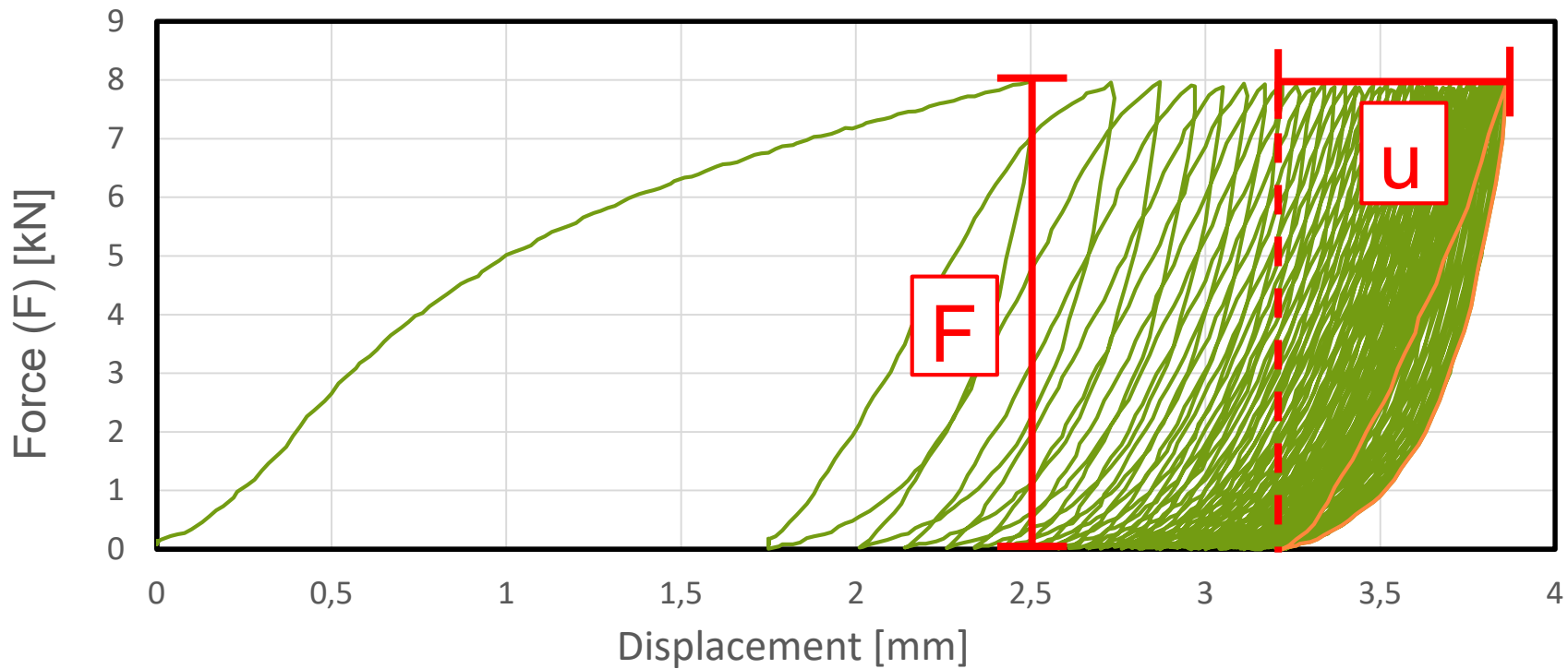
Opiyo (1995)



Samples

Soil	Sandy loam
Literature M_r	60-100
Binder	70-30 lime-cement mixture
Water content	10-22%
Binder content	3-5-7 %
Number of samples	15

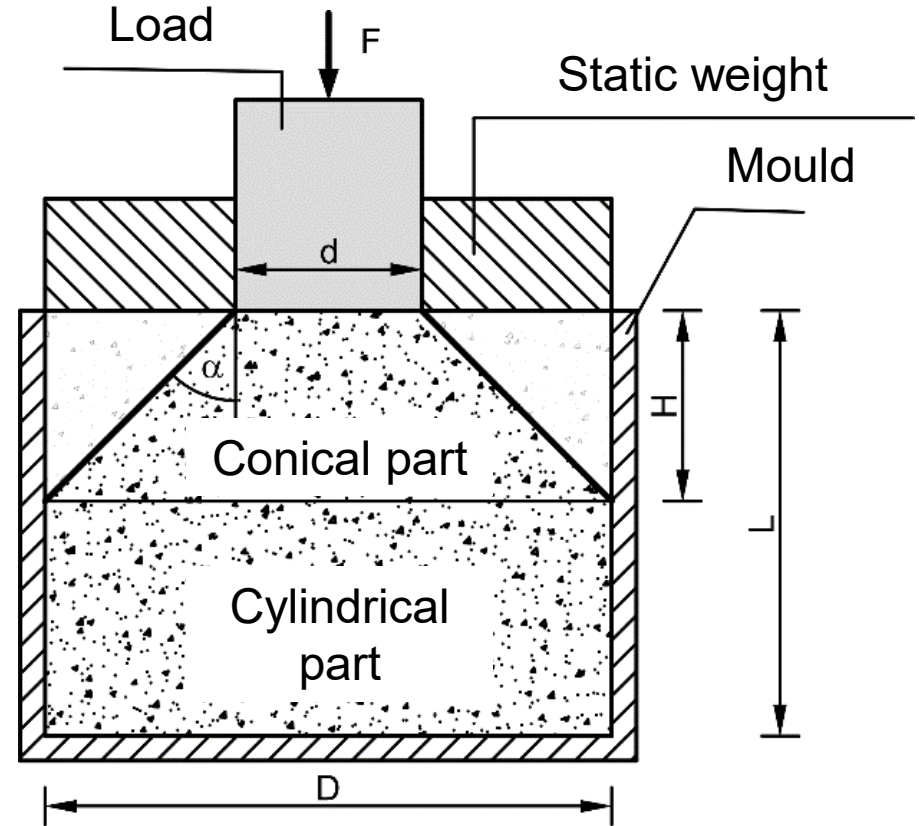
Measurement



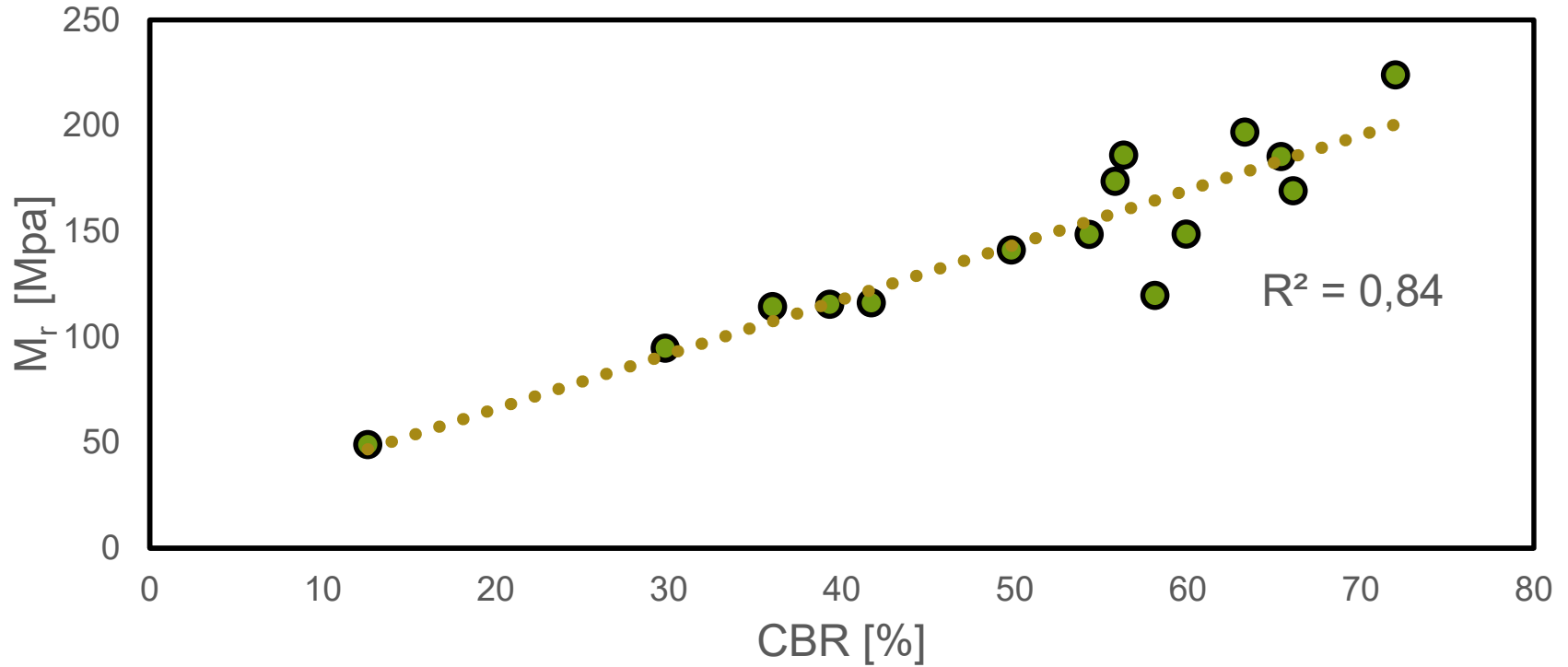
Missing parameters

$$M_r = \frac{\sigma d}{ud} \left[\frac{d(L - H)}{D} \right]$$

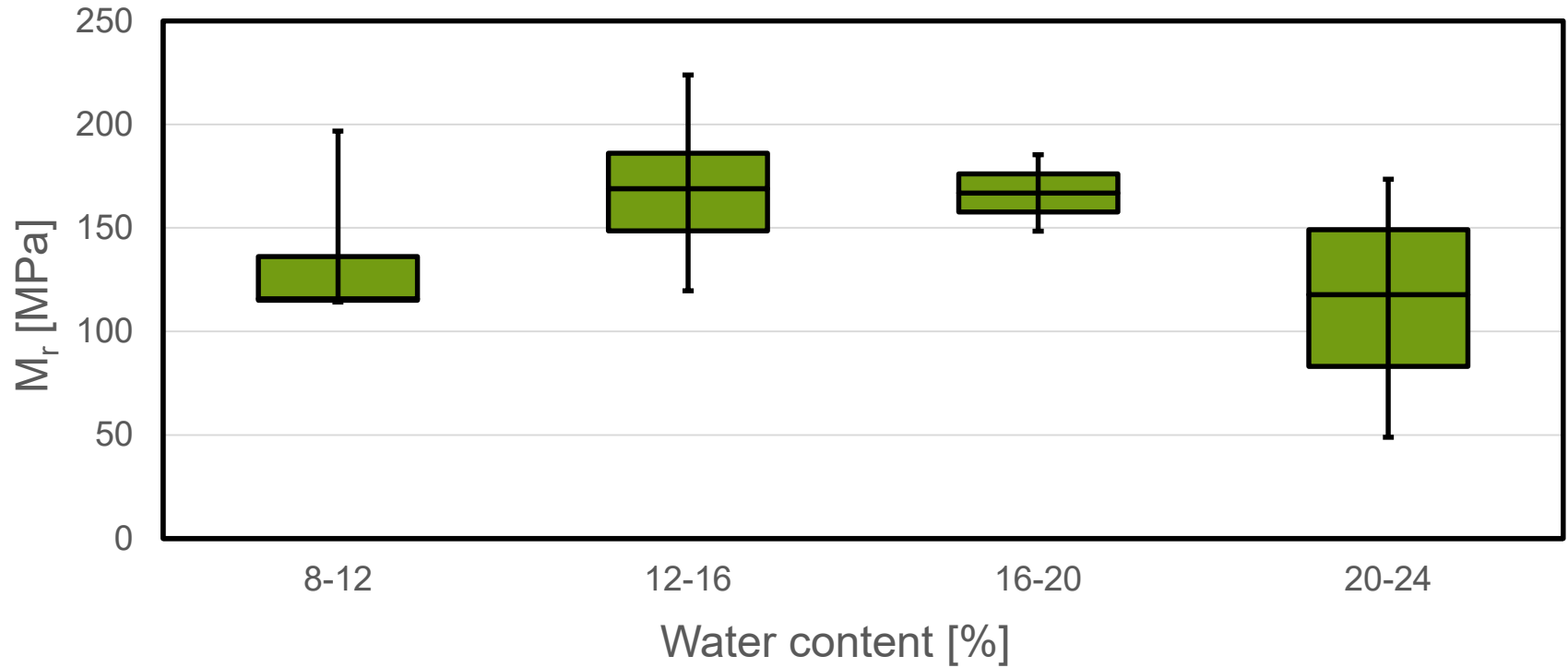
Opiyo (1995)



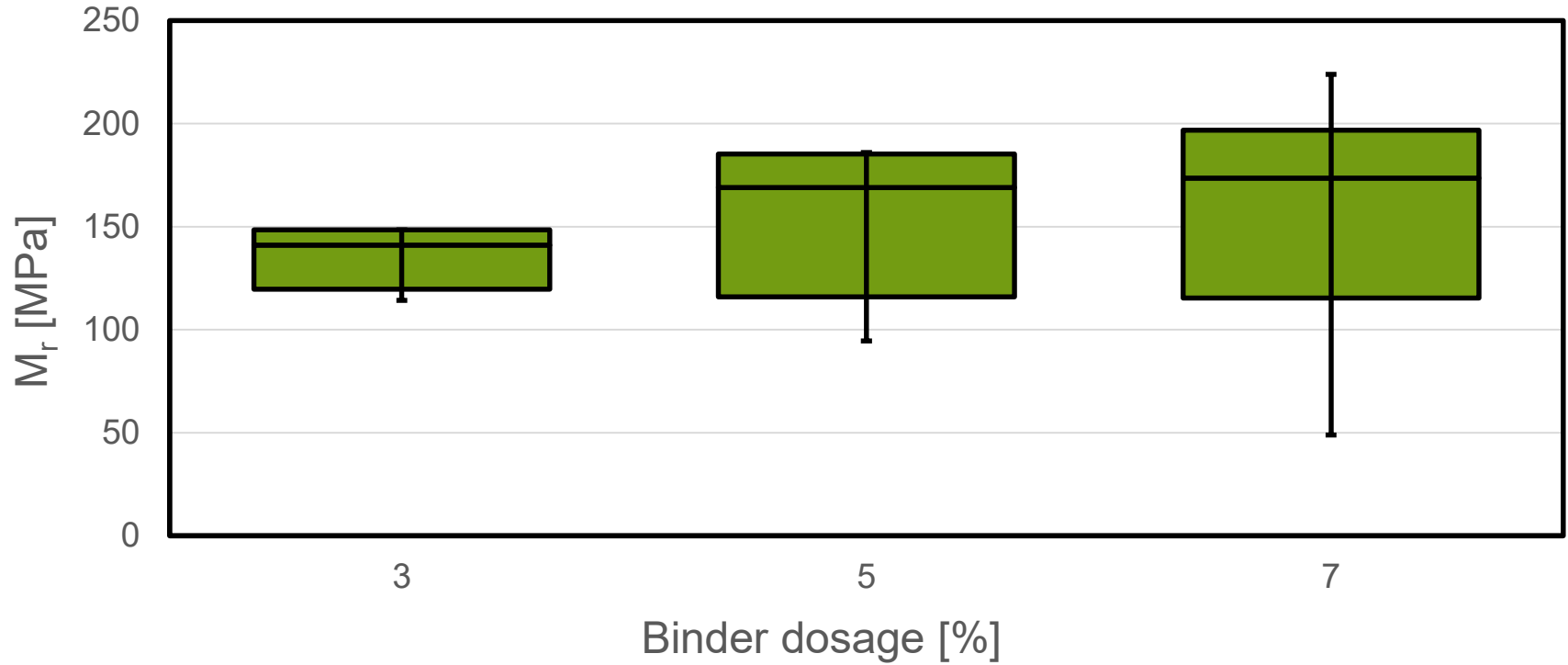
CBR vs. M_r



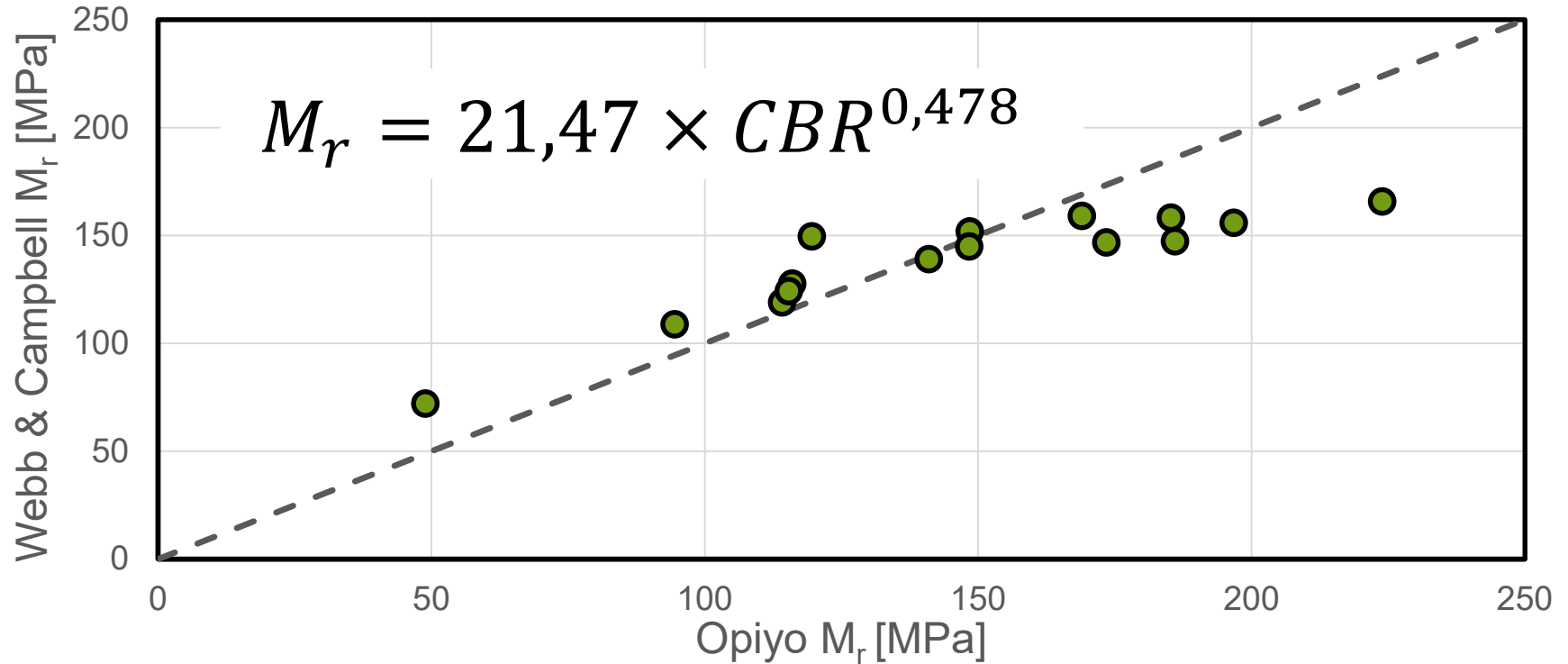
Water content



Binder dosage



Best CBR to M_r : Webb & Campbell



Conclusion

- Connection between CBR and M_r
- Water content has greater effect than binder dosage
- Opiyo's equation resulted in M_r values higher than literature
- M_r can be calculated from CBR with the Webb & Cambell formula

Acknowledgement

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