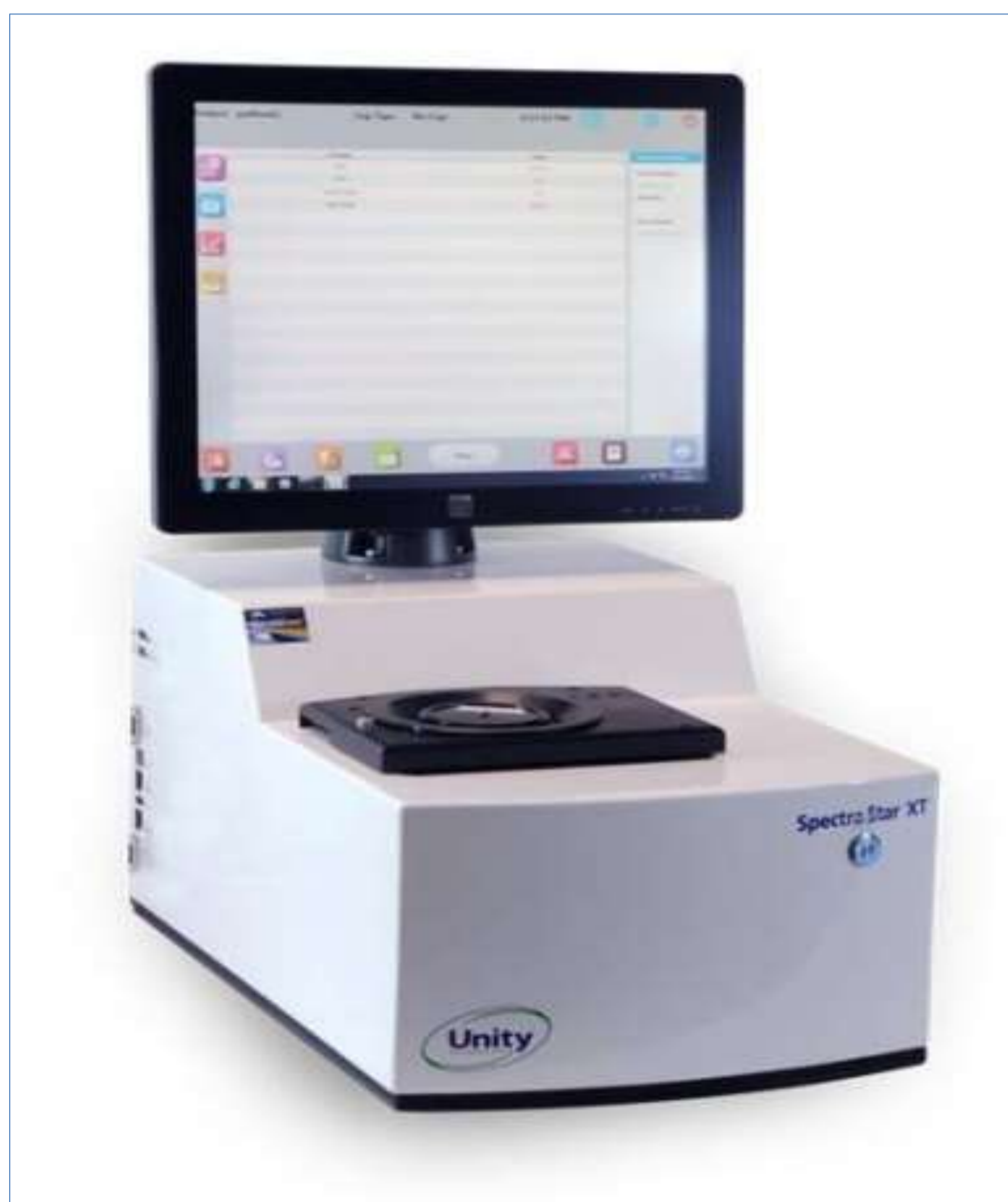


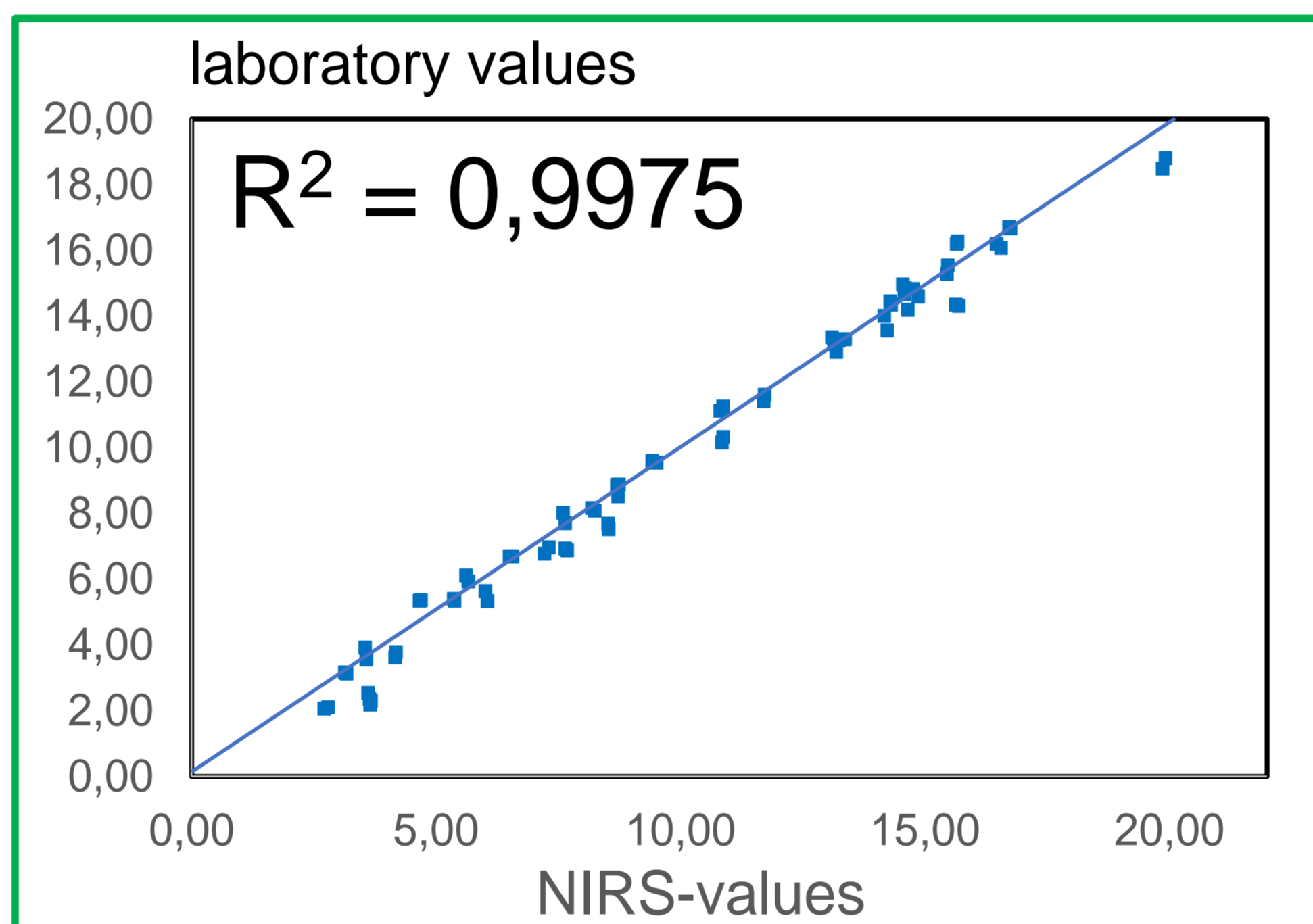
Possibilities and limitations of NIR-spectroscopy in hop analytics

NIR-spectroscopy or abbreviated NIRS is a physical analysis method, which is being used more and more for the determination of plant substances. The great advantage of NIRS is, that you don't need any solvents. In the case of hops, the α -acids are considered the primary quality feature. Standard methods for determining the bitter substances are conductometric titration according to EBC 7.4 and 7.5, as well as HPLC according to EBC 7.7. Since a very large number of samples have to be measured every year for hop breeding, it was started to develop NIRS calibrations for the α -acids, β -acids, but also for xanthohumol and H₂O. The correlations between the wet-chemical and NIRS values were very promising. All values of the coefficients of determination (R^2) were between 0.9 and 1.0, except for xanthohumol ($R^2 = 0.68$). The hop bitter substances and water content can be determined very well with NIRS in hops. NIRS is somewhat less precise than the wet-chemical methods, but perfectly adequate for hop breeding. The concentrations of xanthohumol seems to be too low for NIRS.

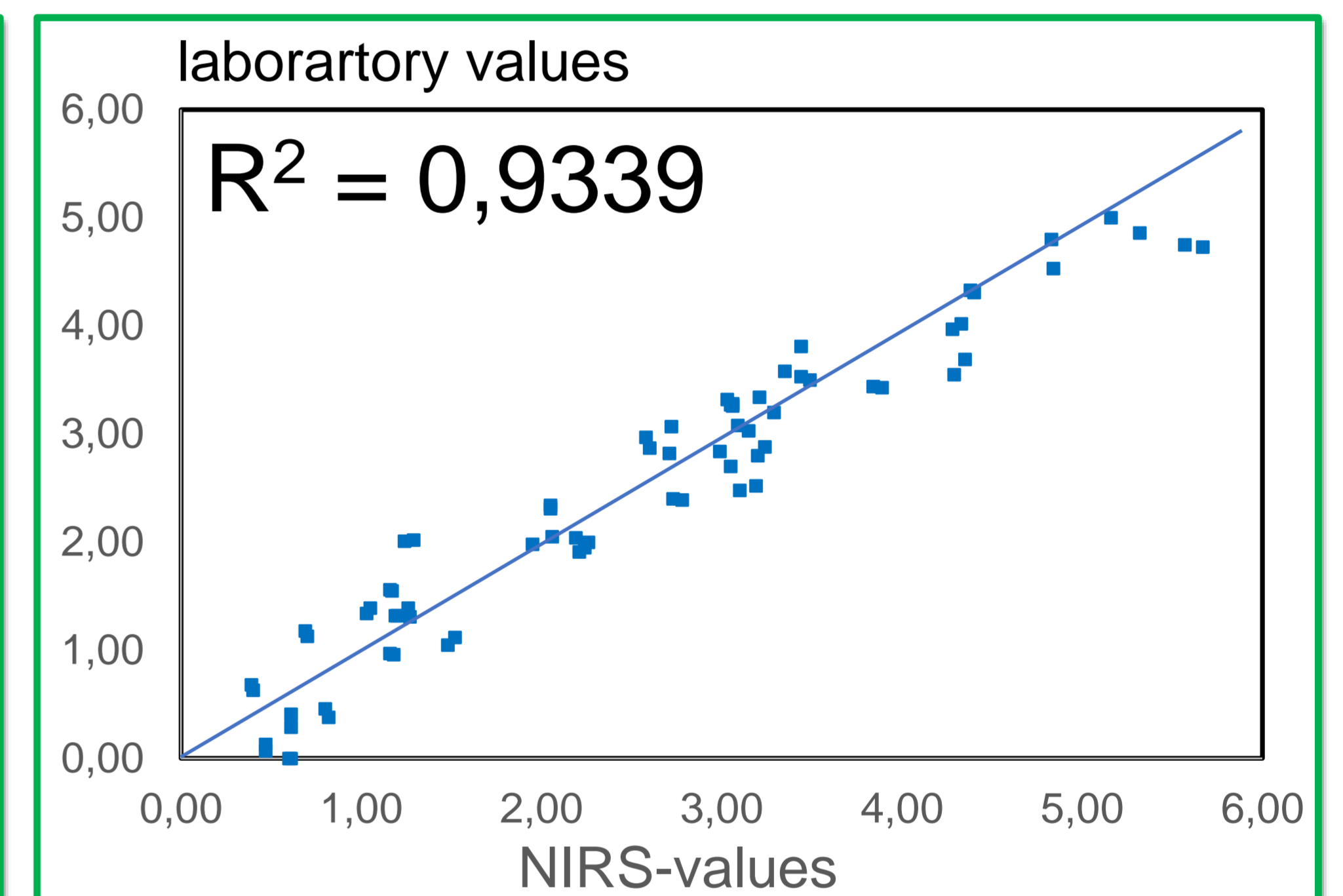


NIRS device from Unity Scientific

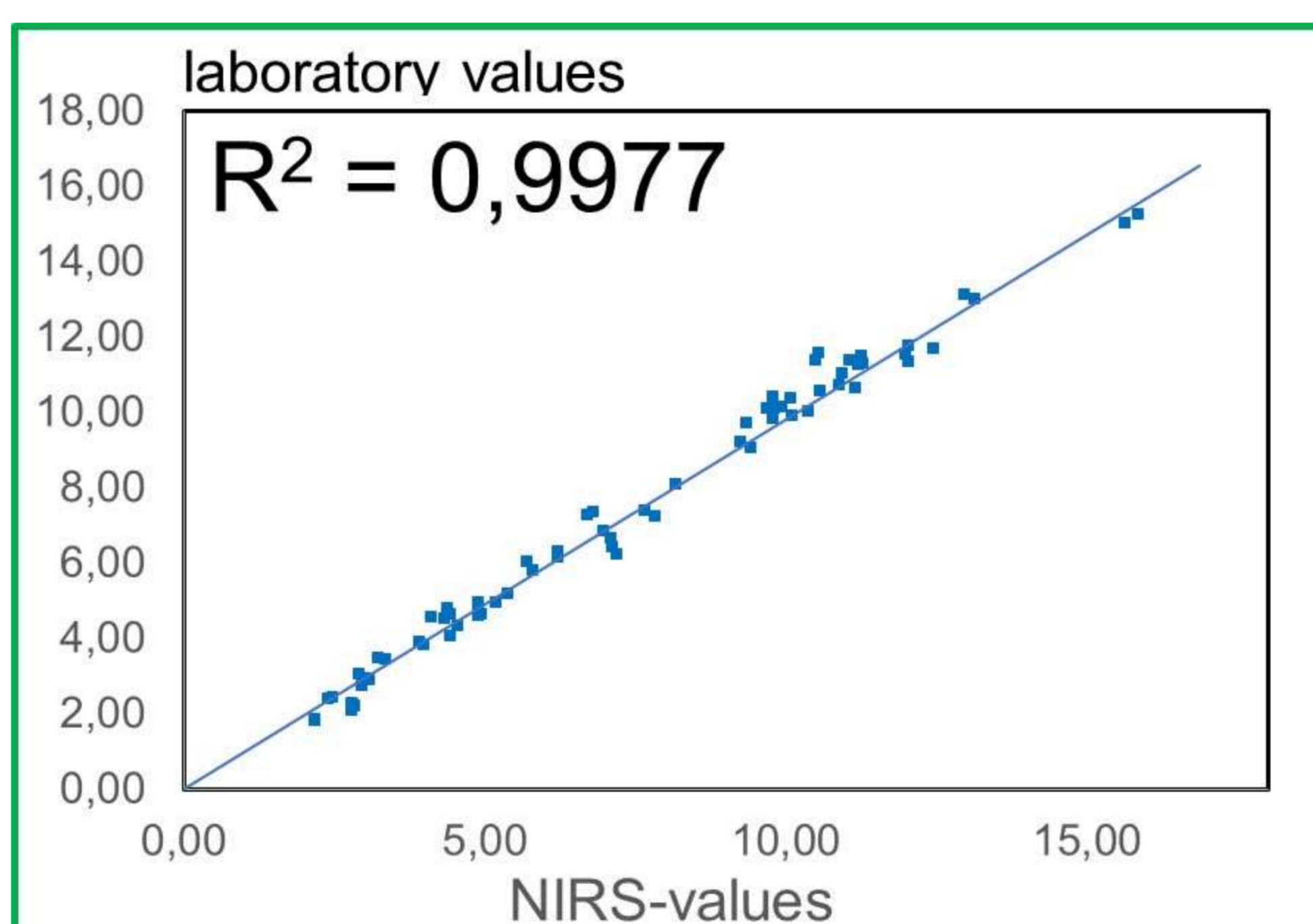
conductometric values in %



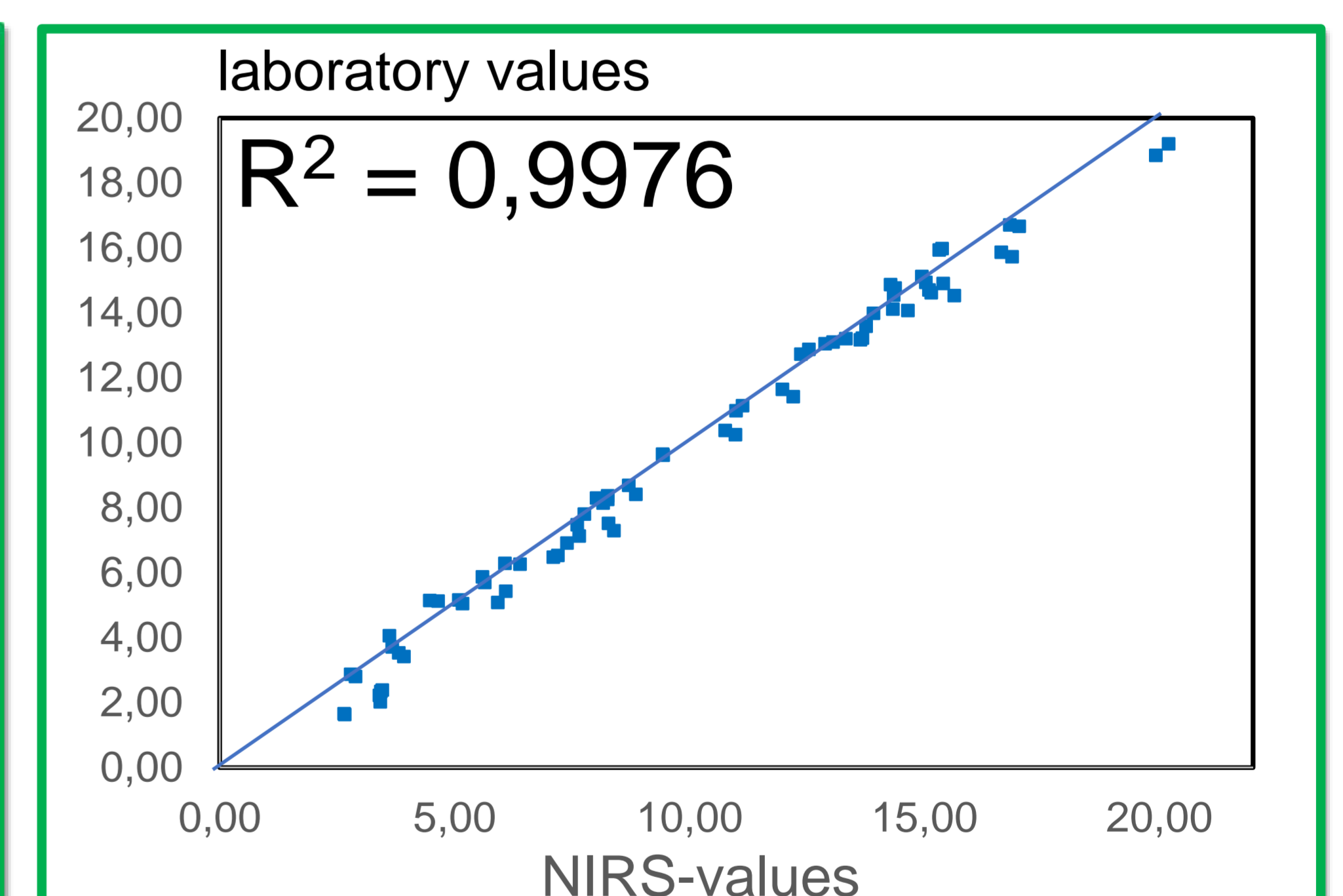
cohumulone (HPLC) in %



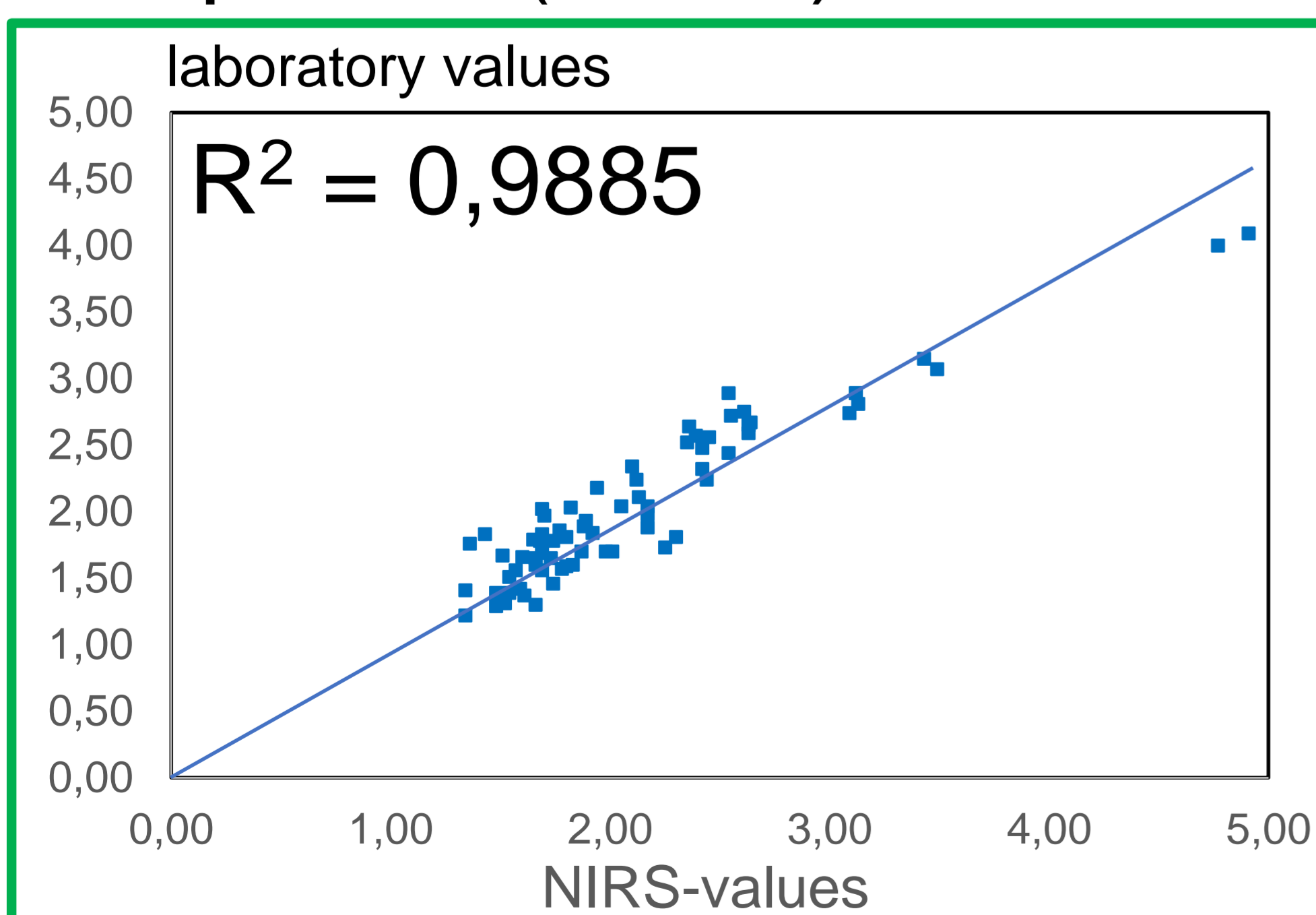
n- + adhumulone (HPLC) in %



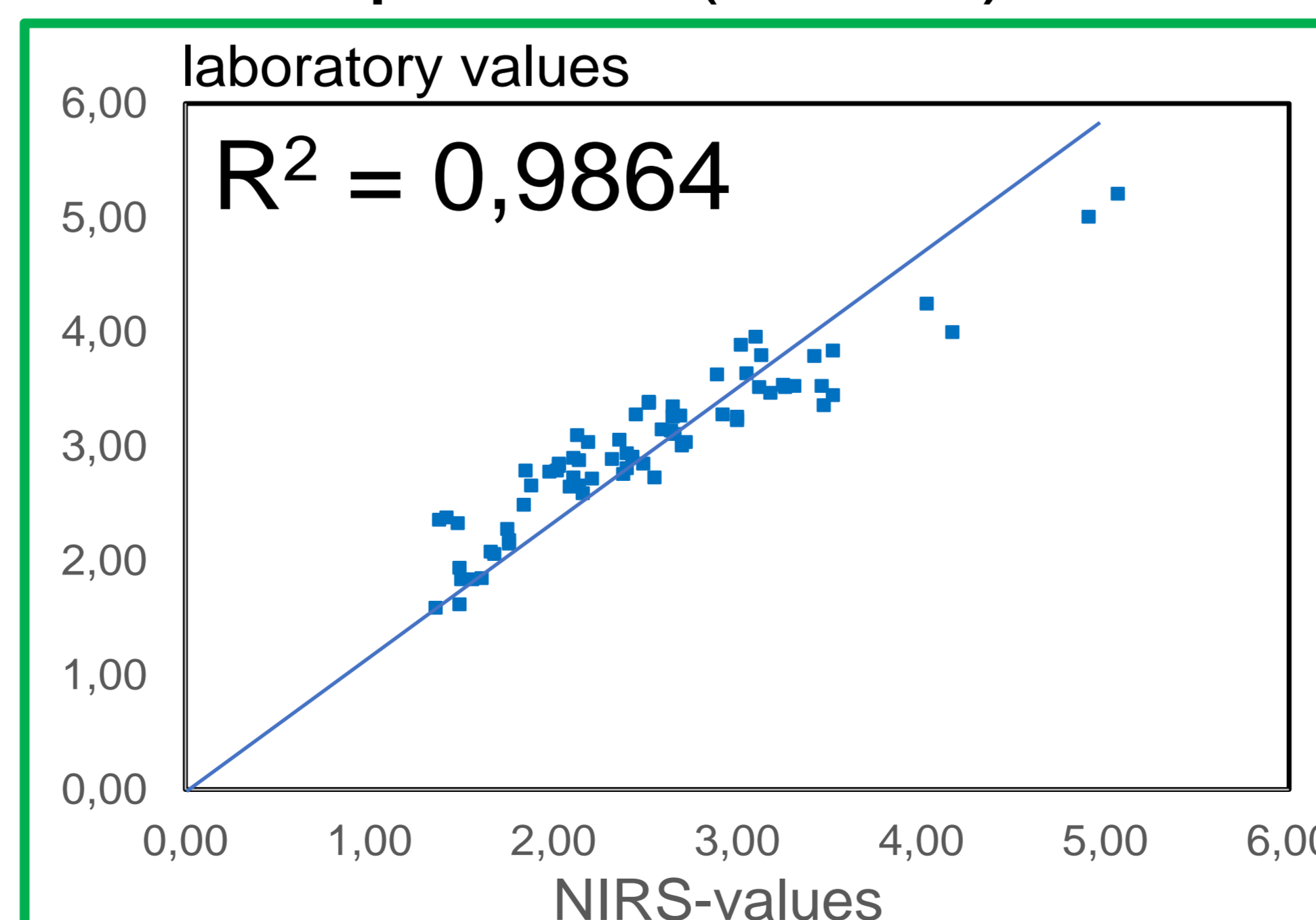
alpha-acids (HPLC) in %



colupulone (HPLC) in %



n + adlupulone (HPLC) in %



beta-acids (HPLC) in %

