

Supplementary material

Table S1. Electrochemical parameters determined from potentiodynamic polarization data of galvanized steel curves in various solutions (K–GS) Kombucha without and (K+GS) with galvanized steel coupon at 3, 7, 10 and 14 days incubation. The acidified black tea (atea) was used to represent the initial stage.

| Samples | E_{corr} (mV) | J_{corr} ($\mu\text{A}/\text{cm}^2$) | β_c (mV) | β_a (mV) |
|---------|------------------------|---|----------------|----------------|
| Atea | -1057 | 26 | -340 | 130 |
| K-GS | | | | |
| 3d | -1063 ± 3 | 22 ± 9 | -283 ± 49 | 138 ± 30 |
| 7d | -1050 ± 8 | 26 ± 2 | -261 ± 3 | 113 ± 18 |
| 10d | -1046 ± 6 | 48 ± 9 | -280 ± 15 | 129 ± 7 |
| 14d | -1031 ± 6 | 74 ± 2 | -285 ± 14 | 126 ± 15 |
| K+GS | | | | |
| 3d | -1080 ± 2 | 39 ± 5 | -298 ± 21 | 156 ± 2 |
| 7d | -1048 ± 2 | 51 ± 2 | -258 ± 6 | 133 ± 4 |
| 10d | -1032 ± 1 | 71 ± 0 | -305 ± 5 | 183 ± 9 |
| 14d | -1017 ± 6 | 68 ± 1 | -282 ± 2 | 165 ± 11 |

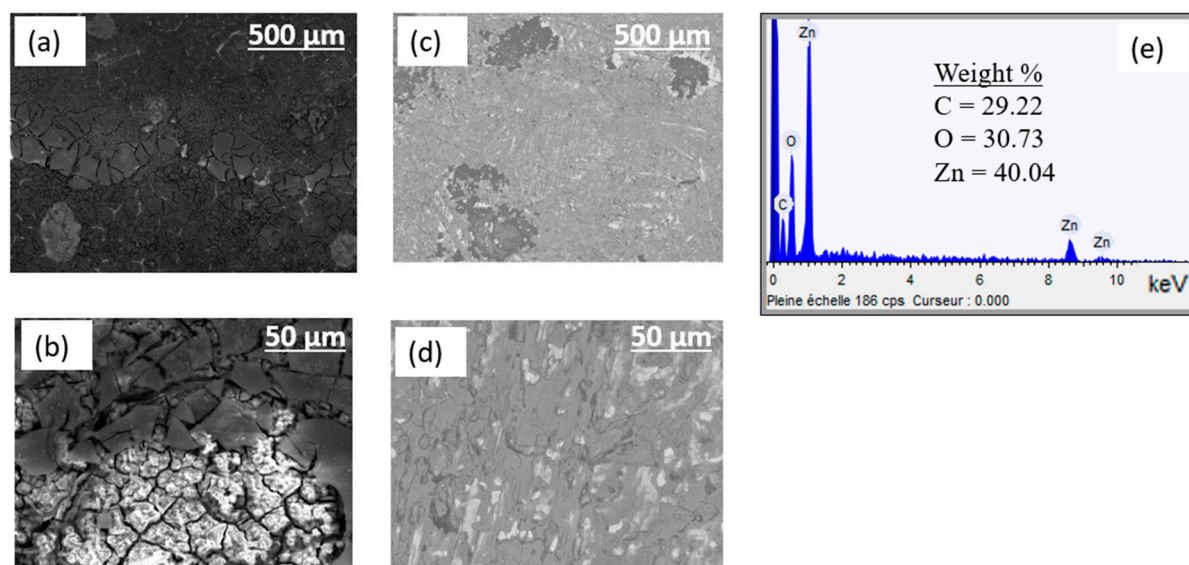


Figure S1. SEM images of galvanized steel coupons (a–b) after 14-days of immersion test in abiotic medium and (c–d) after removing corrosion products. EDS analysis (e) after removing corrosion products.

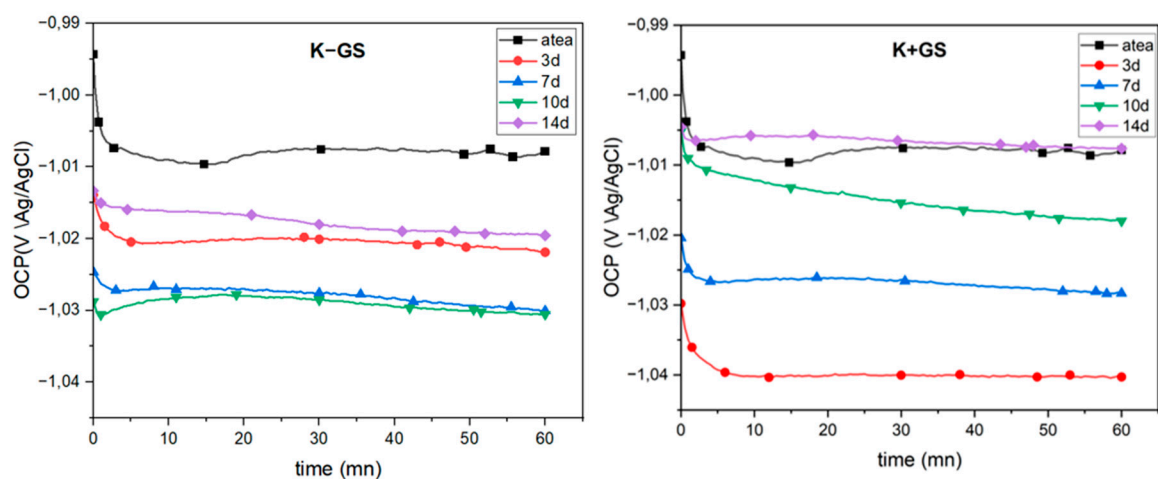


Figure S2. Open circuit potential (OCP) vs. time curves of galvanized steel coupon immersed in various solutions (K–GS) Kombucha without and (K+GS) with galvanized steel coupon at 3. 7. 10 and 14 days of fermentation. The acidified black tea (atea) was used to represent the initial stage.

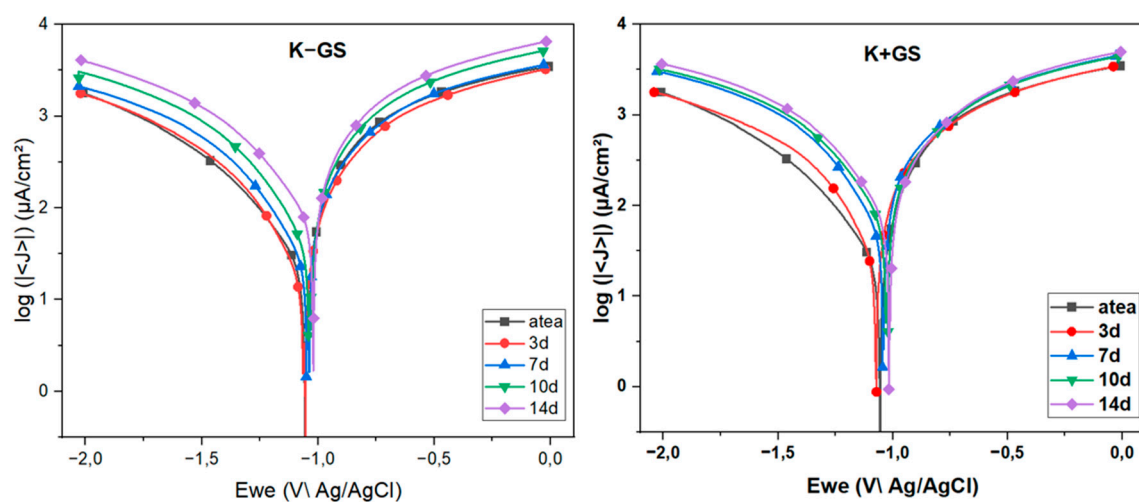


Figure S3. Potentiodynamic polarization curves of galvanized steel coupon immersed in various solutions (K–GS) Kombucha without and (K+GS) with galvanized steel coupon at 0. 3. 7. 10 and 14 days incubation. The acidified black tea (atea) was used to represent the initial stage.

Table S2. Extracted eigenvectors: correlations between variables and factors (J_{corr} : corrosion current density, E_{corr} : corrosion potential).

| | Coefficients of PC1 | Coefficients of PC2 |
|-------------------|---------------------|---------------------|
| pH | -0.372 | 0.219 |
| Sucrose | -0.402 | -0.010 |
| Glucose | -0.355 | -0.072 |
| Fructose | 0.331 | -0.135 |
| Acetic Acid | 0.397 | 0.014 |
| Ethanol | 0.393 | 0.008 |
| E_{corr} | 0.104 | 0.963 |
| J_{corr} | 0.377 | -0.032 |

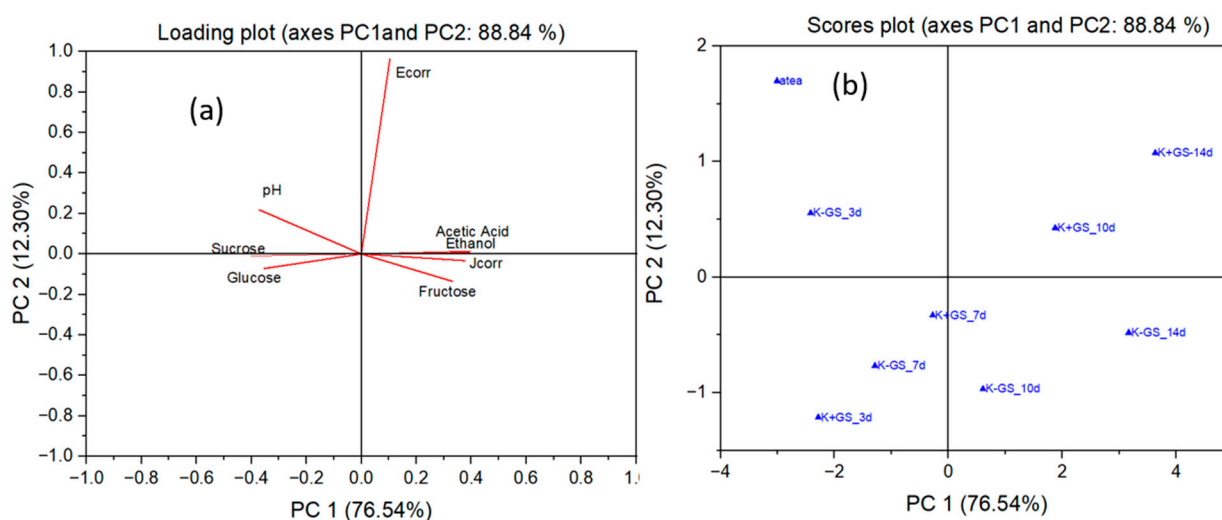


Figure S4. Principal components analysis “loading plot (a),” and “scores plot (b)” of the acidified black tea (atea) and kombucha fermented samples without (K–GS) and with Galvanized steel coupons about the physicochemical (J_{corr} : corrosion current density, E_{corr} : corrosion potential) parameters based on the fermentation time (3d, 7d, 10d, and 14d).

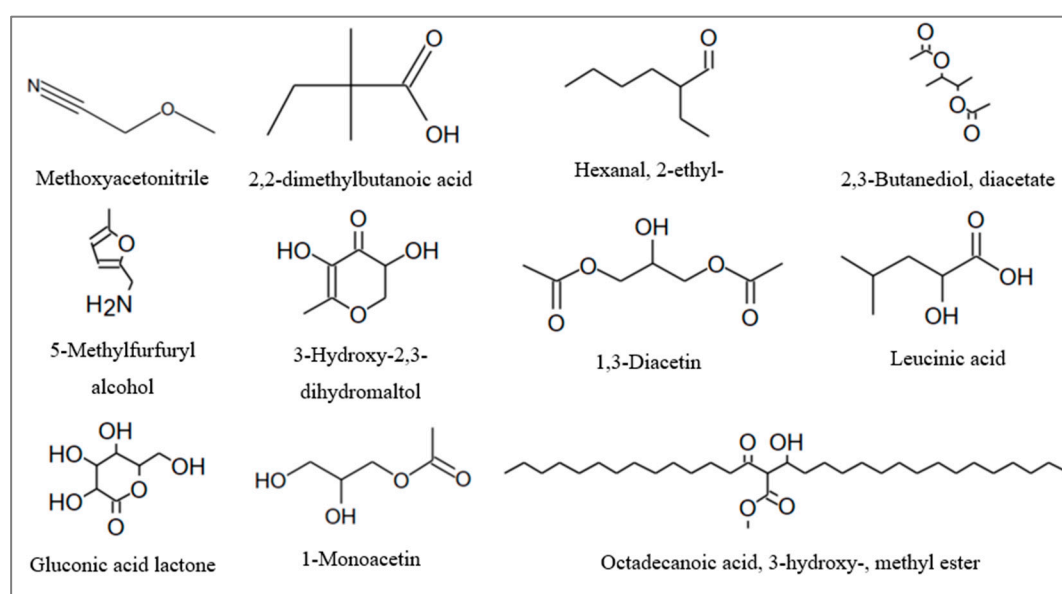


Figure S5. Compounds firstly identified in kombucha black tea (K+GS) in the presence of galvanized steel coupons by GC-MS.