Microbial uptake and utlization of low molecular weight organic substrates in soil depend on carbon oxidation state

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Figure 1

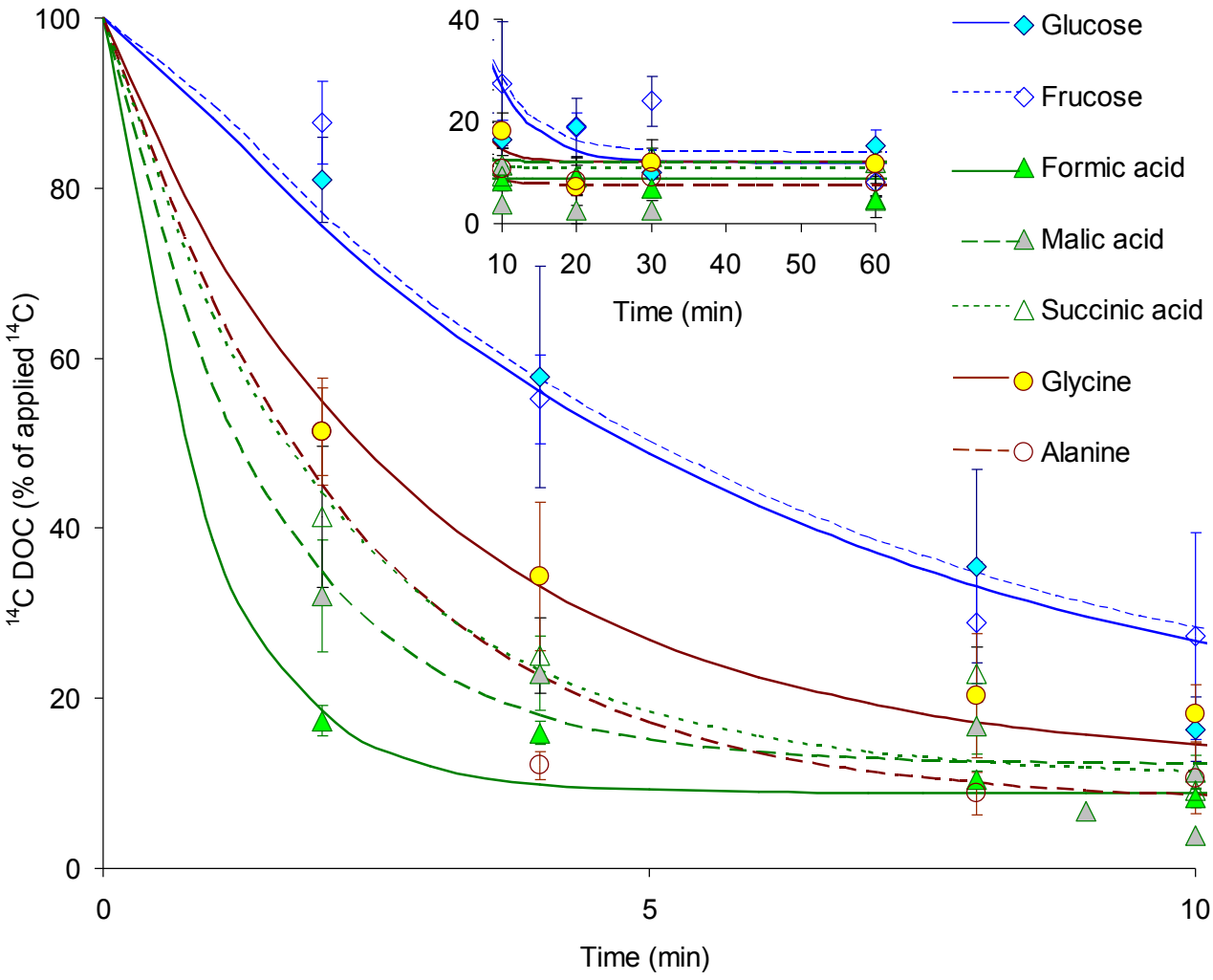

Figure 1. Temporal dynamics of ^{14}C-labelled sugar, organic acid and amino acid disappearance from soil solution. Values represent means ± SE (n = 4). Lines are the following: blue: solid - glucose, dotted - fructose; green: solid - formic acid, dashed - malic acid, dotted - succinic acid; brown: solid - glycine, dashed - alanine.

Figure 2

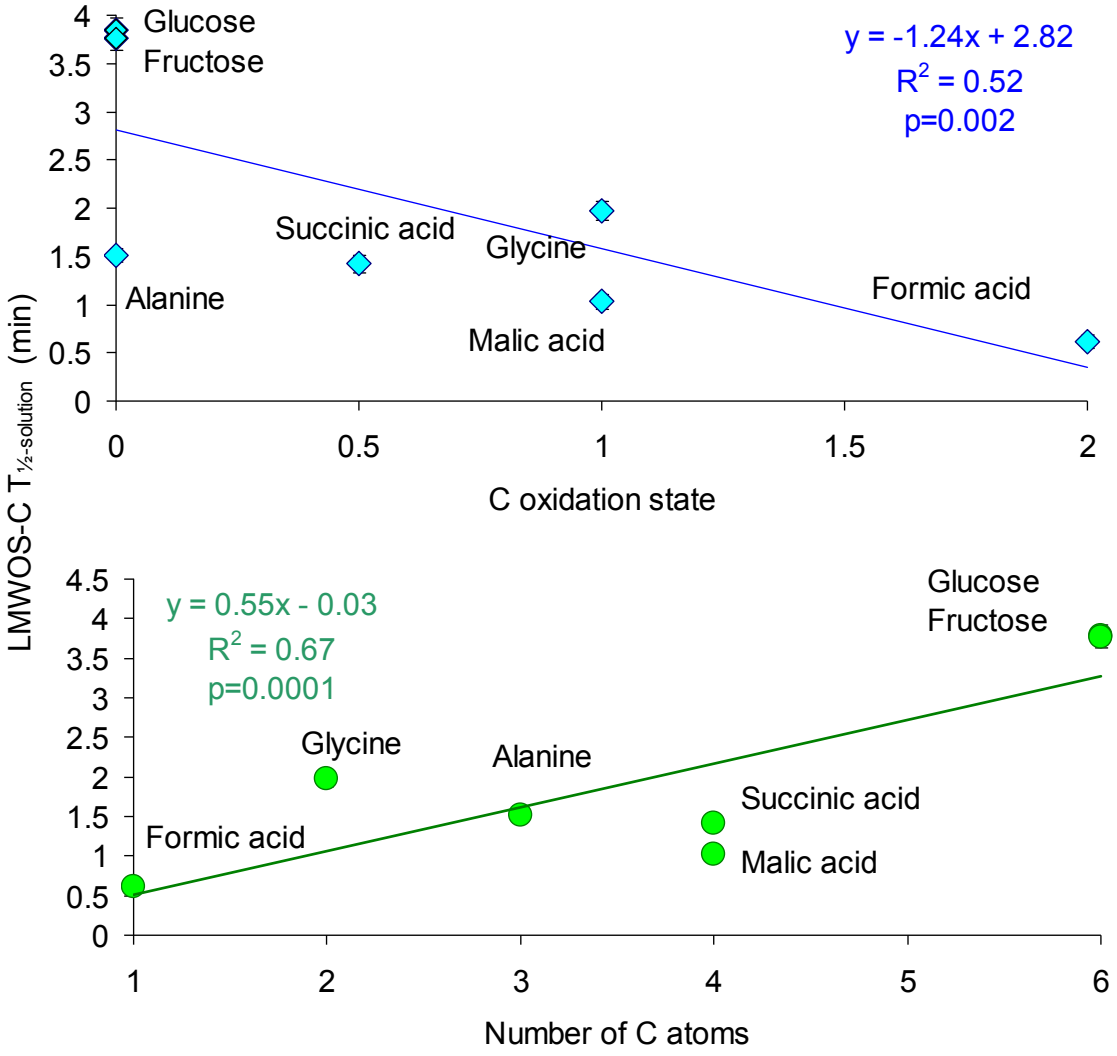

Figure 2. Relationship between the half-life (min) of different LMWOS in soil solution and their C oxidation state (top panel) and number of C atoms in the molecule (bottom panel). Values represent means ± SE (n = 4). The error bars for the half-life times of LMWOS in DOC are smaller than size of icon symbols.

Figure 3

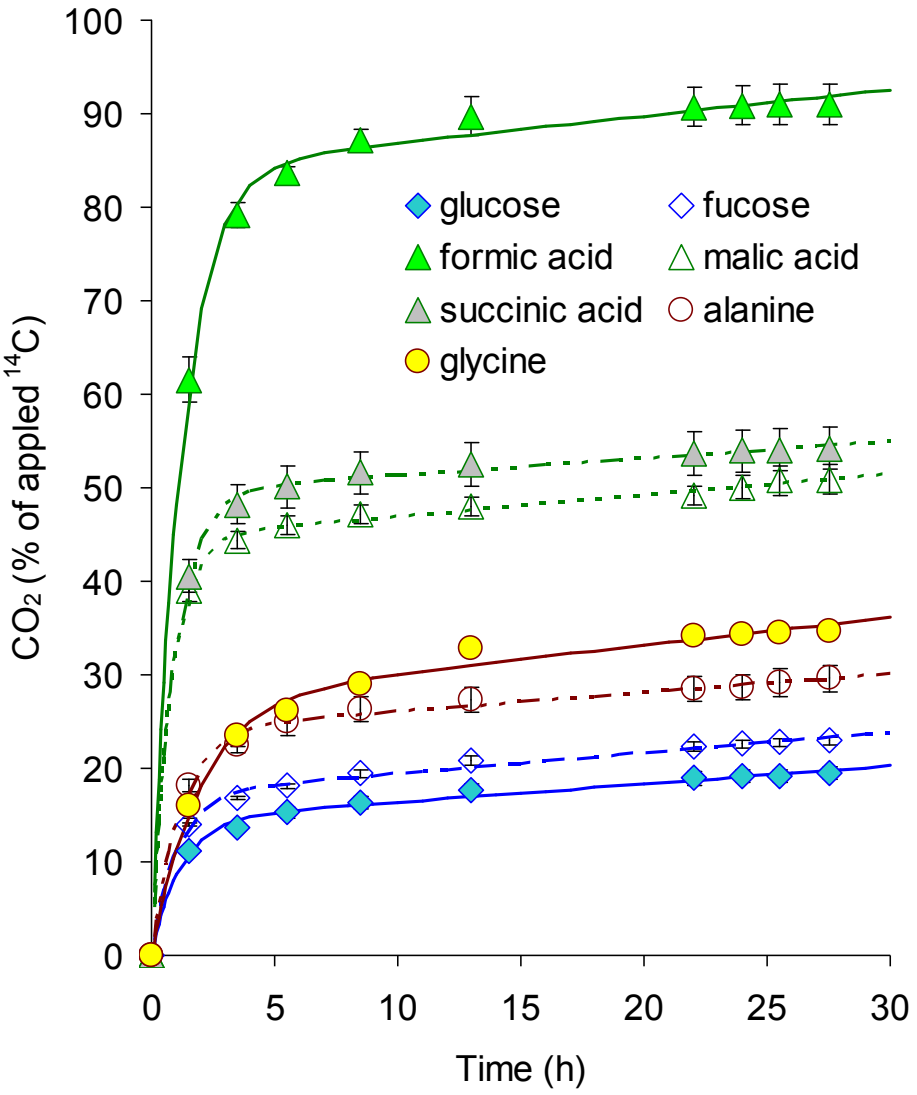

Figure 3. Cumulative ^{14}C-CO_2 production from mineralization of ^{14}C-labelled LMWOS in soil. Values represent means ± SE (n = 4). In case error bars are not present, they are smaller than size of icon symbols.

Figure 4

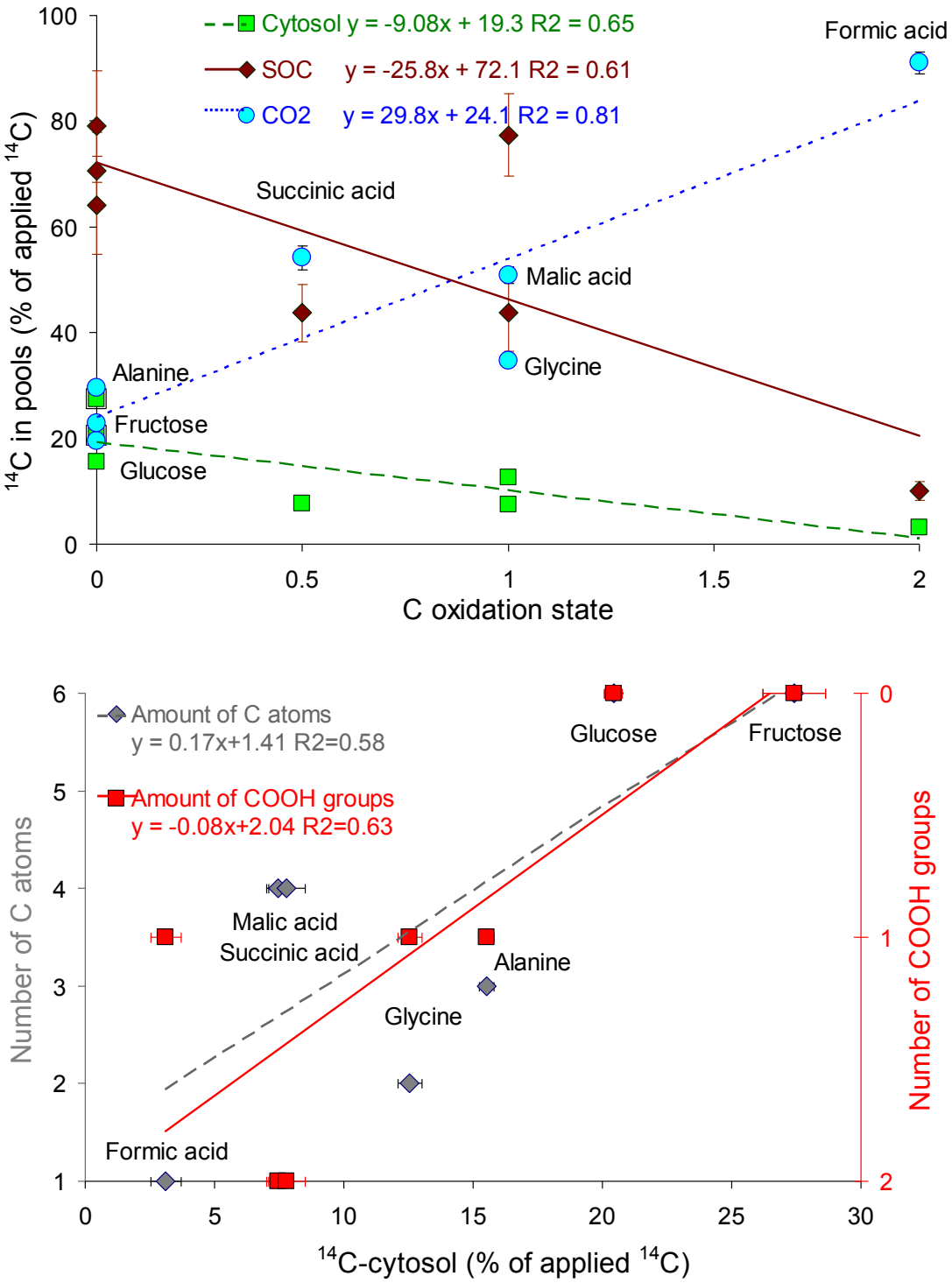

Figure 4. Relationship between ^{14}C remaining in the cytosol, SOC and CO_2 pools and C oxidation state (top panel) and ^{14}C remaining in the cytosol and number of C atoms and -COOH groups (bottom panel) in different LMWOS. Values represent means ± SE (n = 4). P-values for the regression lines on the top panel figure are less than 0.002; p-values for the regression lines on the bottom panel figure are less than 0.004. The substance names are shown only once.

Figure 5

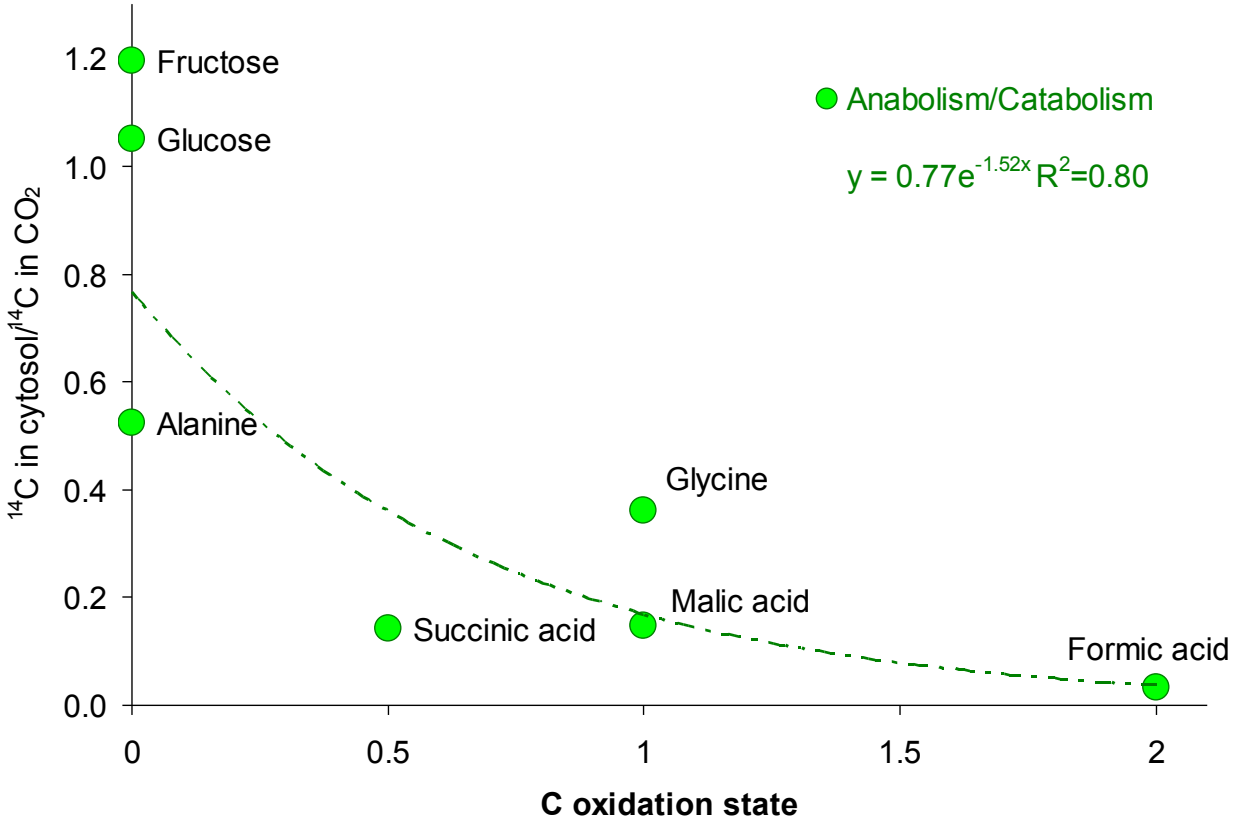

Figure 5. Relationship between ^{14}C incorporated into cytosol (anabolism)/^{14}C incorporated into CO_2 (catabolism) and C oxidation state at the end of LMWOS mineralization experiment.

Figure 6

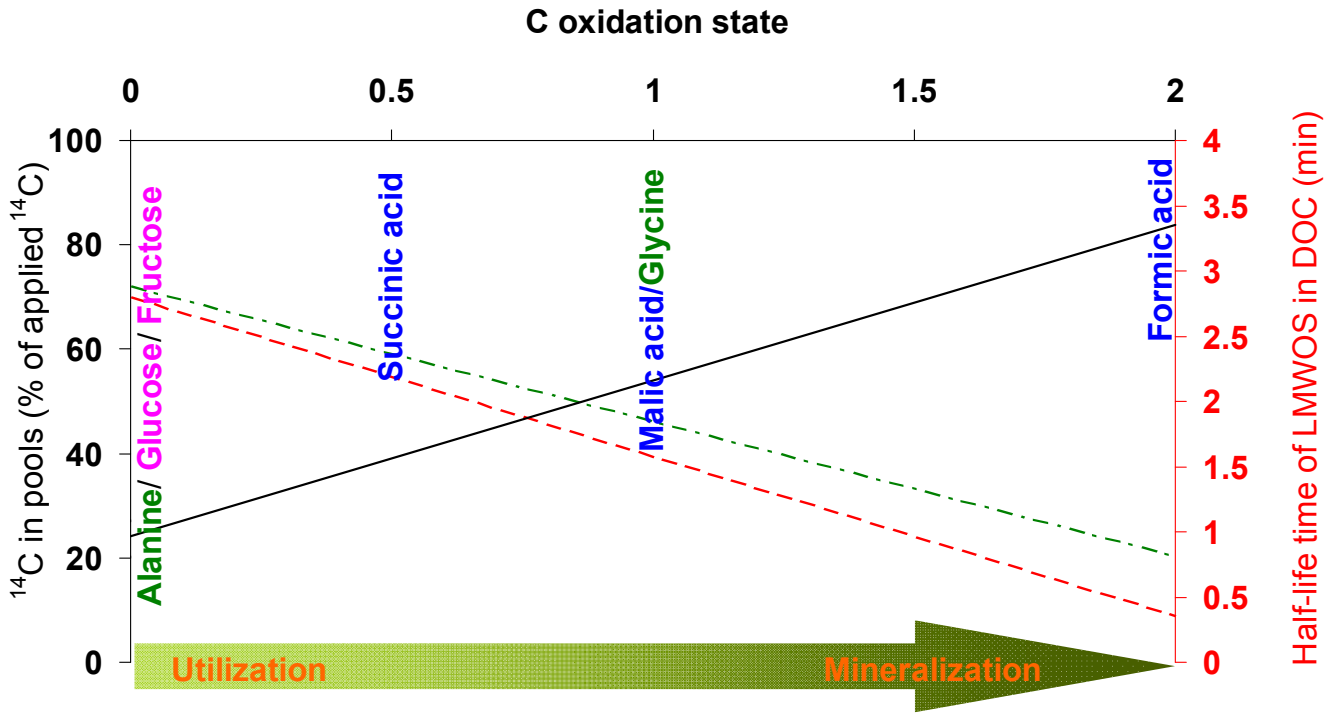

Figure 6. Schematic representation showing the dependence of microbial uptake rate (red), utilization (green) and mineralization efficiency (black) of three distinct classes of LMWOS as a function of substrate C oxidation state.