

Total Synthesis of Fulvic Acid

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Synthesis of fulvic acid (9) was accomplished by a route involving a selective ozonization of (5a), obtained by a regioselective cyclization of (1a).

As a preliminary experiment, (5b), the basic skeleton in (9) was synthesized as follows. Treatment of (1b) with acidic condition (dil.HCl/THF or dil.H<sub>2</sub>SO<sub>4</sub>/HOAc/THF) afforded a single cyclization product (2b). Application of Fujita's debenzoylation method (Me<sub>2</sub>S/BF<sub>3</sub>·OEt<sub>2</sub>) to the BF<sub>2</sub>-complex (3b) of the pyrone (2b) followed by acidic cyclization (conc.HCl/HOAc) led to (5b).

In the same manner, (1a) was converted into the propenyl derivative (5a), whose selective ozonization in the presence of a dye (Oil Violet) as a internal indicator followed by the reduction with methylsulfide produced the aldehyde (6). Selective demethylation of (7), derived from (6), was carried out by treatment with AlCl<sub>3</sub>-Me<sub>2</sub>S to give (8). Finally conversion of (8) into (9) was achieved by the hydration (5% HCl/Me<sub>2</sub>CO, 55°C, 24 h.).

