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Biorefined MIC-inhibitor produced from agricultural waste stream

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The project that started as a DHRTC Radical Innovation Sprint in 2018 and continued from 2020 investigated the use of halophytes as oilfield biocides or inhibitors against microbiologically influenced corrosion (MIC). Now, the project has been tested by the Total Energies and has shown promising results. Internal tests with MIC species have shown a corrosion reduction similar to THPS, a reduction of microbial H_2S production of up to 99.7%, and preliminary tests show a higher specificity towards problematic MIC bacteria than conventional biocides, THPS and Glutaral.

Halophytes are salt-tolerant plants, and some species have been proposed as part of the solution to the soil salinization crisis that is trending towards leaving 50% of the world's arable lands too saline for conventional crops by 2050. While the halophytes accumulate salt from the salt in the plant tissue, challenges have until recently been utilizing the saline biomass so the salt does not leech back into the soil. The salt made incineration, pyrolysis, or biogas production unfeasible because of hot-corrosion and microbial osmotic stress.

However, through a patent-pending cascade extraction process, the salt can be removed from the biomass, and phytochemicals with nutritional and pharmaceutical value can be extracted and prepared for use in food and feed. Once the food-safe fraction and salt are removed, the residual biomass can be further treated into a MIC-inhibitory fraction and a biomass fraction primed for pyrolysis or biogas production for carbon sequestration and energy production.

Envisioned uses for the MIC inhibitor extend beyond the scope of oilfield MIC, and its application in cooling systems and maritime coatings could potentially reduce the loss of steel to corrosion in an environmentally responsible fashion.