Production of 3-aminopropionic acid through novel platform route using fumaric acid producing *E. coli*

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3-aminorpionic acid was produced using aspartase-catalyzed reaction based on fumaric-acid producing *E. coli* mutant (*ΔiclR ΔfumA ΔfumB ΔfumC ΔptsG ΔlacI*) strain. The *C. glutamicum panD* gene (encoding L-aspartate-α-decarboxylase) was overexpressed and the native promoter of the *aspA* gene was replaced with the strong *trc* promoter in fumaric acid producing *E. coli* mutant strain to produce 3-aminopropionic acid. Additionally, overexpression of the *aspA* and phosphoenolpyruvate carboxylase (*ppc*) genes, and the supplementation of ammonium sulfate in the medium allowed production of 3.49 g/L 3-AP. This was further increased to 3.94 g/L by optimizing the expression level of PPC, which was achieved by evaluating 12 different combinations of synthetic promoters and RBS sequences. Fed-batch culture of the final strain yielded 17.9 g/L 3-AP in 89 h, with an overall yield and productivity of 0.186 g 3-AP/g glucose and 0.200 g/L/h, respectively. (Development of systems metabolic engineering platform technologies for biorefineries; NRF-2012-C1AAA001-2012M1A2A2026556) funded by the Ministry of Education, Science and Technology)