Assembly of a novel biosynthetic pathway for production of the plant flavonoid fisetin in Escherichia coli

Plant secondary metabolites are an underutilized pool of bioactive molecules for applications in the food, pharma and nutritional industries. One such molecule is fisetin, which is present in many fruits and vegetables and has several potential health benefits, including anti-cancer, anti-viral and anti-aging activity. Moreover, fisetin has recently been shown to prevent Alzheimer's disease in mice and to prevent complications associated with diabetes type I. Thus far the biosynthetic pathway of fisetin in plants remains elusive. Here, we present the heterologous assembly of a novel fisetin pathway in Escherichia coli. We propose a novel biosynthetic pathway from the amino acid, tyrosine, utilizing nine heterologous enzymes. The pathway proceeds via the synthesis of two flavanones never produced in microorganisms before – garbanzol and resokaempferol. We show for the first time a functional biosynthetic pathway and establish E. coli as a microbial platform strain for the production of fisetin and related flavonols.

General information
State: Published
Organisations: Novo Nordisk Foundation Center for Biosustainability, Research Groups, Applied Metabolic Engineering, Bacterial Cell Factories, iLoop
Number of pages: 10
Pages: 84-93
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: Metabolic Engineering
Volume: 31
ISSN (Print): 1096-7176
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 7.95 SJR 3.337 SNIP 1.787
Web of Science (2017): Impact factor 7.674
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 8.33 SJR 3.626 SNIP 1.865
Web of Science (2016): Impact factor 8.142
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 8.2 SJR 3.6 SNIP 1.809
Web of Science (2015): Impact factor 8.201
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 7.23 SJR 3.395 SNIP 2.009
Web of Science (2014): Impact factor 6.767
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 8.43 SJR 4.036 SNIP 2.164
Web of Science (2013): Impact factor 8.258
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): CiteScore 6.72 SJR 2.989 SNIP 1.847
Web of Science (2012): Impact factor 6.859
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 6.75 SJR 3.049 SNIP 2.038
Web of Science (2011): Impact factor 5.614
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 2.375 SNIP 1.786
Web of Science (2010): Impact factor 5.512
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 2.621 SNIP 1.4
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 1.789 SNIP 1.03
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.508 SNIP 1.182
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.28 SNIP 0.897
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 1.069 SNIP 1.042
Scopus rating (2004): SJR 1.688 SNIP 1.255
Scopus rating (2003): SJR 1.177 SNIP 0.869
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 1.702 SNIP 1.068
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 0.925 SNIP 0.755
Scopus rating (2000): SJR 0.724 SNIP 0.9
Original language: English
Keywords: Fisetin, Resokaempferol, Garbanzol, Cell factory, Biosynthetic pathway, Polyphenols
Electronic versions:
1_s2.0_S1096717615000828_main.pdf
DOIs:
10.1016/j.ymben.2015.07.002

Bibliographical note
This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/)
Source: PublicationPreSubmission
Source-ID: 114402414
Research output: Research - peer-review › Journal article – Annual report year: 2015