



# Paul Christou

## Professor Investigador (ICREA)

### Dades personals

**Categoria:** Professor Investigador (ICREA)

**Àrea de coneixement:** Biotecnologia

**Adreça:** ETSEA, Edifici Principal A

**Telèfon:** +34 973 702831

**E-mail:** [paul.christou@udl.cat](mailto:paul.christou@udl.cat) [ <mailto:paul.christou@udl.cat> ]

**Personal Website:** <https://www.icrea.cat/Web/ScientificStaff/paul-christou-319> [ <https://www.icrea.cat/Web/ScientificStaff/paul-christou-319> ]

### Formació Acadèmica

- Llicenciat en Ciències, Universitat de Londres, Chelsea College, UK, 1977
- Doctorat, Universitat de Londres, University College, UK, 1980

### Experiència Professional

- 2004-actualitat, Investigador ICREA, Universitat de Lleida
- 2001-2004, Professor, Fraunhofer Institute of Molecular Biotechnology and Applied Ecology, Schmallenberg, Aachen, Alemanya
- 1998 – 1994, Professor i Responsable de l'Unitat de Biotecnología, John Innes Centre, UK

### Recerca

- Biotecnologia aplicada a la obtenció de cereales resistentes al estrés abiótico como sequía y salinidad.

### Docència



## Publicacions Recents

Capell T, Twyman RM, Armario-Najera V, Ma JKC, Schillberg S, **Christou P** (2020) Potential applications of plant biotechnology against SARSCoV-2. *Trends in Plant Science*, <https://doi.org/10.1016/j.tplants.2020.04.009>.

Moreno JA, Díaz-Gómez J, Fuentes-Font L, Angulo E, Gosálvez LF, Sandmann G, Portero-Otin M, Capell T, Zhu C, **Christou P**, Nogareda C (2020) Poultry diets containing (keto)carotenoid-enriched maize improve egg yolk color and maintain quality *Animal Feed Science and Technology* 206:114334-114344

Jin X, Baysal C, Gao L, Medina V, Drapal M, Ni X, Sheng Y, Shi L, Capell T, Fraser PD, **Christou P**, Zhu C. (2019) The subcellular localization of two isopentenyl diphosphate isomerases in rice suggests a role for the endoplasmic reticulum in isoprenoid biosynthesis" *Plant Cell Reports* Nov 2. doi: 10.1007/s00299-019-02479-x.

Banakar R, Fernandez AA, Zhu C, Abadia J, Capell T, **Christou P** (2019) The ratio of phytoalexins to deoxymugenic acid controls metal homeostasis in rice *Planta* 250:1339-1354 doi: 10.1007/s00425-019-03230-2

Mir-Artigues P, Twyman RM, Alvarez D, Cerda-Bennasser P, Balcells M, **Christou P**, Capell T (2019) A simplified techno-economic analysis of molecular pharming *Biotechnology and Bioengineering* 116:2526-2539 doi: 10.1002/bit.27093.

Diaz Benito P, Banakar R, Rodriguez-Menendez S, Capell T, Pereiro R, **Christou P**, Abadía J, Fernández B, Álvarez-Fernández A (2018) Iron and zinc in the embryo and endosperm of rice (*Oryza sativa* L.) seeds in contrasting 2'-deoxymugenic acid/nicotianamine scenarios *Frontiers in Plant Science* doi: 10.3389/fpls.2018.01190

Zanga D, Sanahuja G, Eizaguirre M, Albajes R, **Christou P**, Capell T, Fraser P, Gerrisch C, López C (2018) Carotenoids moderate the effectiveness of a Bt gene against the European corn borer, *Ostrinia nubilalis* *PlosOne* 13(7):e0199317. doi: 10.1371/journal.pone.0199317. eCollection 2018.

Vamvaka E, Farré G, Molinos-Albert LM, Evans A, Canela-Xandri A, Twyman RM, Carrillo J, ordoñez RA, Shattock R, O'Keefe BR, Clotet B, Blanco J, Khush GS, **Christou P**, Capell T (2018) Unexpected synergistic HIV neutralization by a trile microbicide produced in rice endosperm. *Proc Natl Acad Sci of USA* 115: E7854-E7862

Pérez L, E Soto, G. Villorbina, L Bassie, V Medina, P Muñoz, T Capell, C Zhu, **P Christou**, G Farré (2018) CRISPR/Cas9-induced monoallelic mutations in the cytosolic AGPase large subunit gene *APL2* induce the ectopic expression of *APL2* and the corresponding small subunit gene *APS2b* in rice leaves *Transgenic Research* 27: 423-439

Berman U, Zorrilla-Lopez U, Sandmann G, Capell T, **Christou P**, Zhu C (2017) The silencing of carotenoid B-hydroxylases by RNA interference in different maize genetic backgrounds increases the b-carotene content of the endosperm. *International Journal of Molecular Sciences* 18:2515



- Díaz-Gómez J, J.A. Moreno, E. Angulo, G. Sandmann, C. Zhu, AJ Ramos, T. Capell, **P. Christou**, Nogareda C (2017) High-carotenoid biofortified maize is an alternative to color additives in poultry feed *Journal: Animal Feed Science and Technology* 231:38-46
- Banakar R, Alvarez-Fernandez A, Díaz-Benito P, Abadia J, Capell T, and **Christou P** (2017) Phytosiderophores determine thresholds for iron and zinc accumulation in biofortified rice endosperm while inhibiting the accumulation of cadmium *J Exp Bot* 68:4983-4995
- Zhu C; Farre G; Zanga D; Lloveras J; Michelena A; Ferrio JP; Voltas J; Slafer GA; Savin R; Albajes R; Eizaguirre M; Lopez C; Cantero-Martínez C; Díaz-Gómez J; Nogareda C; Moreno JA; Angulo E; Estany J; Pena RN; Tor M; Portero-Otin M; Eritja N; Arjó G; Serrano JCE; Matias-Guiu X; Twyman RM; Sandmann G; Capell T; **Christou P** (2018) High-carotenoid maize: development of plant biotechnology prototypes for human and animal health and nutrition *Phytochemistry Reviews* 17: 195-209
- Berman, J; Zorrilla, U; Medina, V; Farré, G; Sandmann, G; Capell, T; **Christou, P**; Zhu, C (2017) The Arabidopsis ORANGE (AtOR) gene promotes carotenoid accumulation in transgenic corn hybrids derived from parental lines with limited carotenoid pools *Plant Cell Reports* 36:933-945
- Diaz-Gomez J, Twyman RM, Zhu C, Farre G, Serrano JCE, Capell T, **Christou P** (2017) Biofortification of crops with nutrients: factors affecting utilization and storage. *Current Opinion in Biotechnology* 44: 115-123
- Zanga D, Capell T, Slafer GA, **Christou P**, Savin R (2016) A carotenogenic mini-pathway introduced into white corn does not affect development or agronomic performance *Scientific Reports* 6: 38288
- Moreno JA, Diaz-Gomez J, Nogareda C, Angulo E, Sandmann G, Portero-Otin M, Serrano JCE, Twyman RM, Capell T, Zhu C, **Christou P** (2016) The distribution of carotenoides in hems fed on biofortified maize is influenced by feed composition, absorption, resource allocation and storage *Scientific Reports* 6:35346
- Bortesi, L; Zhu, C; Zischewski, J; Perez, L; Bassié, L; Nadi, R; Forni, G; Lade, S; Soto, E; Jin, X; Medina, V; Villorbina, G; Muñoz, P; Farré, G; Fischer, R; Twyman, R; Capell, T; **Christou, P**; Schillberg, S (2016) Patterns of CRISPR/Cas9 activity in plants, animals and microbes. *Plant Biotechnology Journal* 14:2203-2216
- Banakar; Alvarez Fernández, Á; Abadia, J; Capell, T; **Christou, P** (2016) The expression of heterologous Fe (III) phytosiderophore transporter HvYS1 in rice increases Fe uptake, translocation and seed loading and excludes heavy metals by selective Fe transport. *Plant Biotechnol J* 15: 423-432
- Zhu C, Bortesi L, Baysal C, Twyman RM, Fischer R, Capell T, Schillberg S, **Christou P** (2017) Characteristics of genome editing mutations in cereal crops. *Trends in Plant Science* 22: 38-52
- Bai C., Berman J., Farre G., Capell T., Sandmann G., **Christou P.**, Zhu C (2017) Reconstruction of the astaxanthin biosynthesis pathway in rice endosperm reveals a metabolic bottleneck at the level of endogenous -carotene hydroxylase activity. *Transgenic Research* 26:13-23
- Berman J, Sheng Y, Gómez Gómez L, Veiga T, Ni X, Farre G, Capell T, Guitian J, Guitian P, Sandmann G, **Christou P** Zhu C, (2016) Red anthocyanins and yellow carotenoids form the color of orange-flower gentian (*Gentiana lutea* L. var. *aurantiaca*) *PLoS ONE* doi:10.1371/journal.pone.0162410.



Breitenbach J, Nogueira M Farre G Zhu C Capell T **Christou P** Fleck G Fockem U Fraser PD Sandmann G (2016) Engineered maize as a source of astaxanthin: processing and application as fish feed. *Transgenic Research* 25: 785-739

Comas, J; Benfeitas, R; Vilaprinyo, E; Sorribas, A; Solsona, F; Farré, G; Berman J, Zorrilla U, Capell, T; Sandmann, G; Zhu, C; **Christou, P**; Alves, R (2016) Identification of line-specific strategies for improving carotenoid production in synthetic maize through data-driven mathematical modelling *The Plant Journal* 87: 455-471.

Vamvaka, E; Arcalis E, Ramessar, K; Evans, A; O'Keefe, B; Shattock, R; Piles, V; Stoger E, **Christou, P**; Capell, T (2016) Cyanovirin-N produced in rice endosperm offers effective pre-exposure prophylaxis against HIV-1BaL infection in vitro *Plant Cell Reports* 35: 1309-1319

Farré G, Perez-Fons L, Decourcelle M, Breitenbach J, Hem S, Zhu C, T Capell, **Christou P**, Fraser PD, Sandmann G (2016) Metabolic engineering of astaxanthin biosynthesis in maize endosperm and characterization of a prototype high oil hybrid *Trangenic Research* 25:477-489

Vamvaka, E; Arcalis E, Ramessar, K; Evans, A; O'Keefe, B; Shattock, R; Piles, V; Stoger E, **Christou, P**; Capell, T (2016) Rice endosperm is cost effective for the production of recombinant griffithsin with potent activity against HIV . *Plant Biotechnology Journal* 14: 1427-1437

S Ahrazem O, Rubio-Moraga A, Berman J, Capell T, **Christou P**, Zhu C, Gómez-Gómez L (2016) The carotenoid cleavage dioxygenase CCD2 catalysing the synthesis of crocetin in spring crocuses and saffron is a plastidial enzyme. *New Phytologist* 209: 650-663

Zanga, D; Capell, T; Zhu, C; **Christou, P**; Thangaraj, H (2016) Freedom-to-operate analysis of a transgenic multivitamin corn variety *Plant Biotechnol Journal*. 14: 1225-1240

Chang; S J Berman; Y Sheng; Y Wang; T Capell; L Shi; X Ni; G Sandmann; **P Christou**; C Zhu (2015) Cloning and functional characterization of the maize (*Zea mays* L.) carotenoid epsilon hydroxylase gene *PLoS ONE* 10(6):e0128758. doi: 10.1371/journal.pone.0128758.

Bai, C T.Capell, J Berman, V Medina, G.Sandmann, **P.Christou**, C. Zhu (2016) Bottlenecks in carotenoid biosynthesis and accumulation in rice endosperm are influenced by the precursor–product balance. *Plant Biotechnology Journal* 14:195-205

Nogareda, C; Moreno, JA; Angulo, E; Sandmann, G; Portero, M; Capell, T; Zhu, C; **Christou, P** (2016) Carotenoid-enriched transgenic corn delivers bioavailable carotenoids to poultry and protects them against coccidiosis. *Plant Biotechnology Journal* 14: 160-168

Vamvaka E, Twyman RM, Murad A, Melnik S, Teh A, Arcalis E, Altmann F, Stoger E, Rech E, Ma J, **Christou P**, Capell T.(2016) A recombinant HIV-neutralizing antibody produced in rice endosperm accumulates predominantly as an aglycosylated derivative with enhanced neutralizing activity. *Plant Biotechnology Journal* 14: 97-108

