

STUDENTS' CONFERENCE

Jožef Stefan International Postgraduate School
and Young Researchers' Day CMBO

19 and 20 April

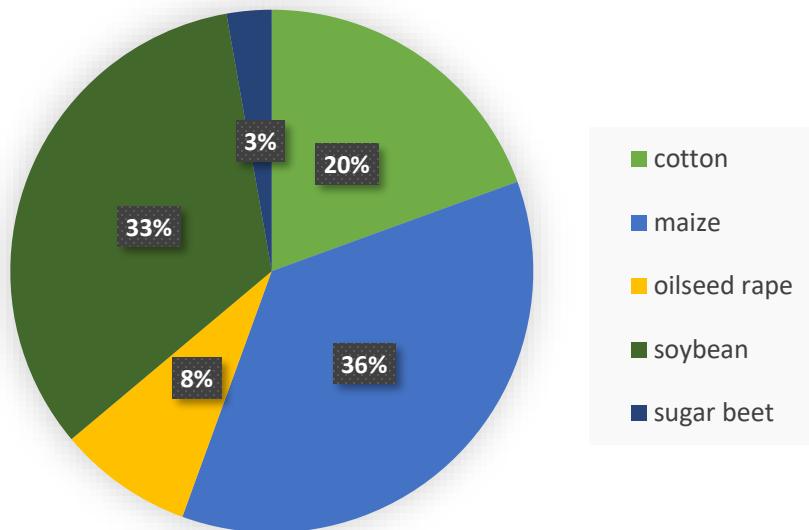
Novel approaches for detection and quantification of genetically modified organisms (GMOs)

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National Institute of Biology,

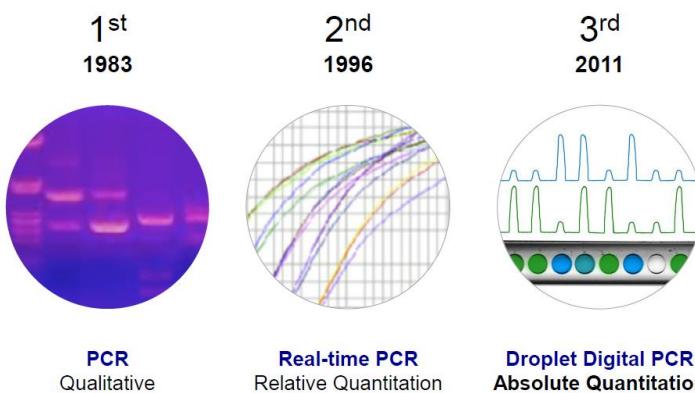
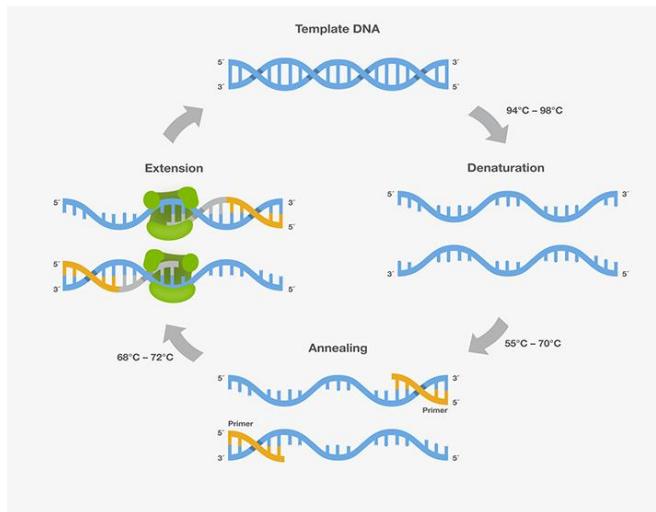
Department of Biotechnology and Systems biology

Poster number: 63

GENETICALLY MODIFIED ORGANISMS - GMOs

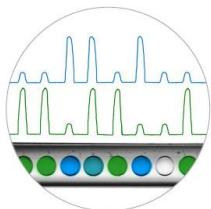


DNA BASED DETECTION AND QUANTIFICATION OF GMOs

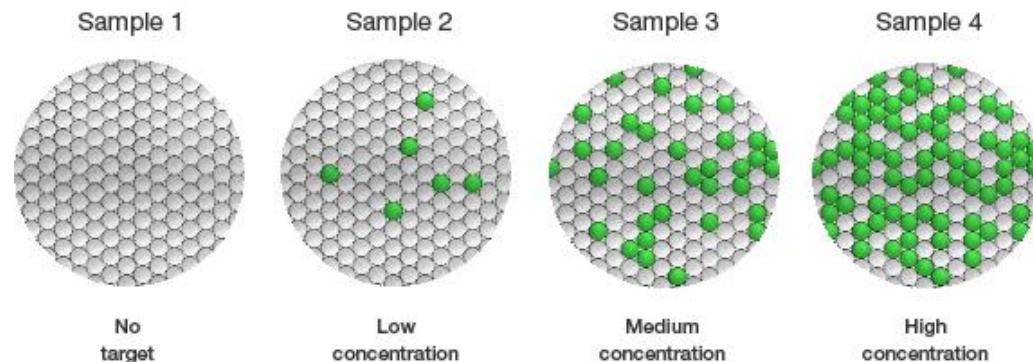


3rd
2011

DIGITAL PCR

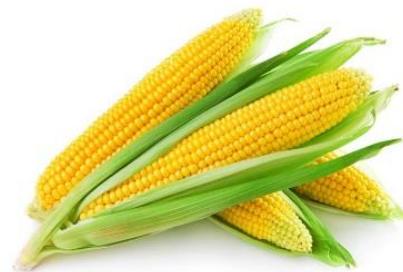


Droplet Digital PCR
Absolute Quantitation

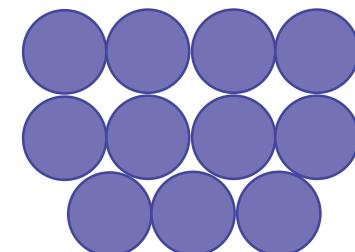
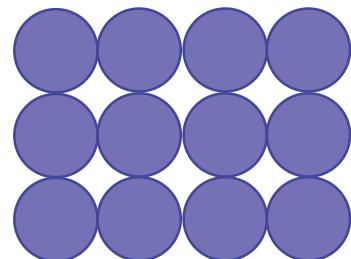


Siméon Denis Poisson (1781-1840)

MULTIPLEX QUANTIFICATION WITH ddPCR



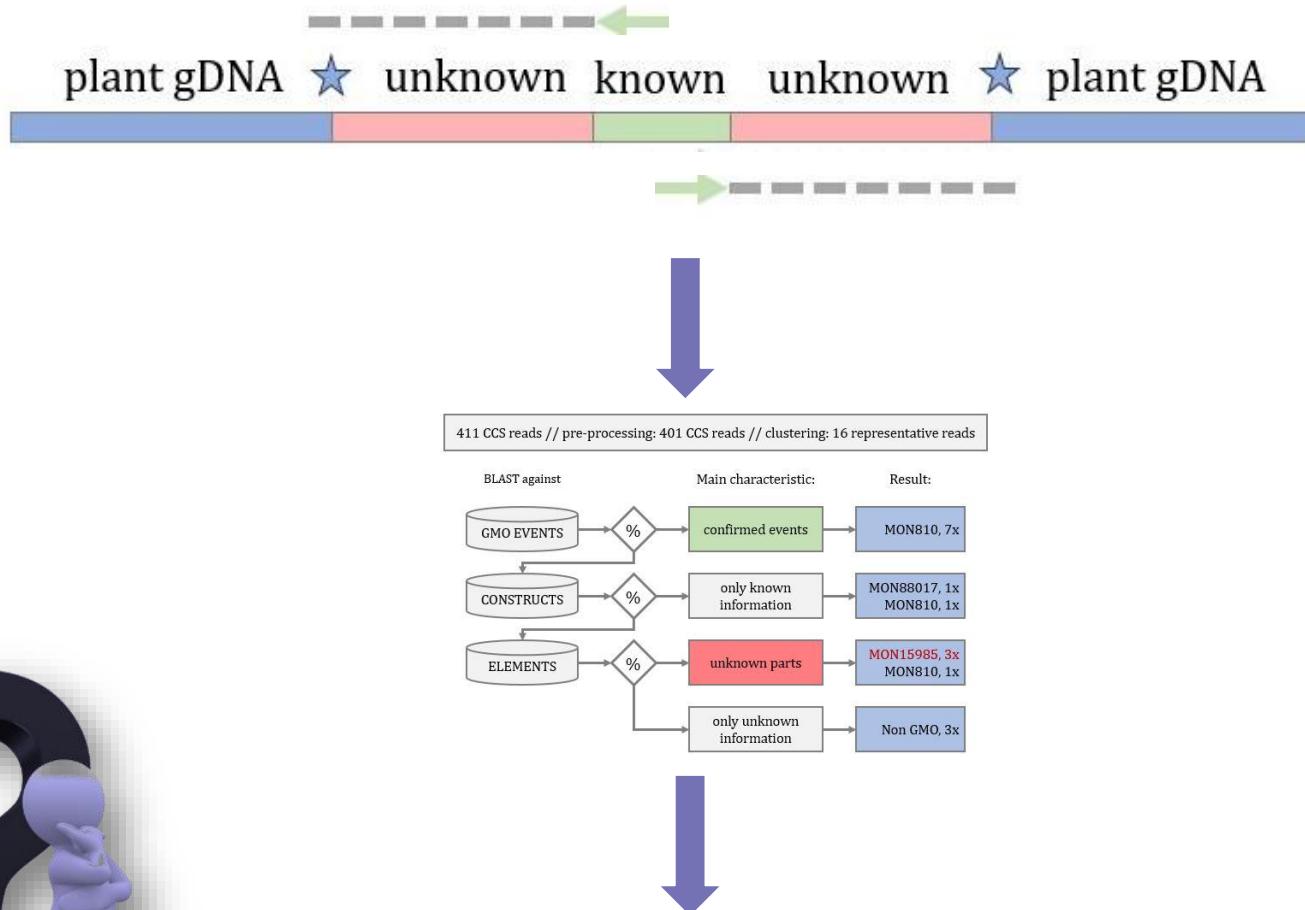
qPCR



Multiplex ddPCR



WHAT ABOUT UNAUTHORISED GMOs?



More on novel approaches for detection and quantification of GMOs



Poster no. 63

Acknowledgement:

prof. Dr. Jana Žel
Dr. David Dobnik



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Novel approaches for detection and quantification of genetically modified organisms

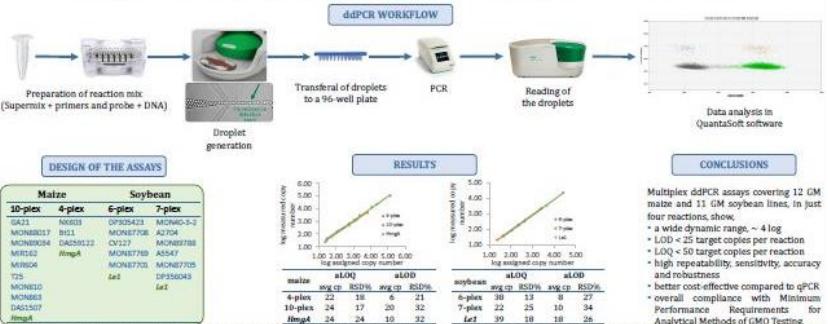
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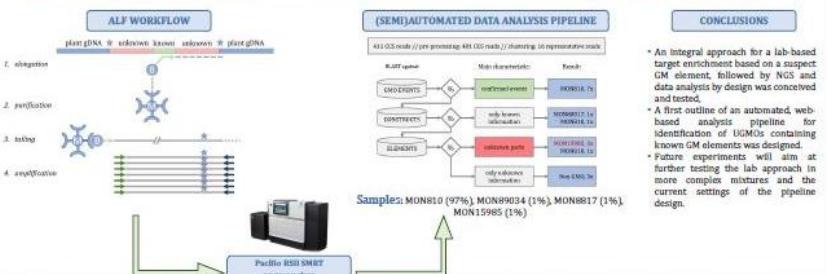
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ABSTRACT food and feed products containing genetically modified organisms (GMO) need to be labelled in The European Union (EU). The labelling threshold is set at 0.9 % for authorized GMOs per ingredient. Due to increasing number of EU authorized GMOs, standard qPCR assays and screening strategies are no longer cost-effective. Therefore, multiplex droplet digital PCR (ddPCR) assays, enabling direct quantification of 12 GM maize and 11 GM soybean lines authorised in EU in just four reactions, were developed. However, with the increased use of authorized GMOs, especially in feed products, the possibility of intentional or unintentional presence of unauthorized or unknown GMOs (UGMOs) is also on the rise. Thus, we developed a novel gene-walking (GW) technology coupled with qNGS called amplification of linear-enriched fragments (ALF), for which the proof of principle was shown on a complex sample, containing four GMOS of different concentrations. Furthermore, a first outline of an automated, web-based analysis pipeline for identification of UGMOs containing screening elements has been developed. To prove the power of the designed pipeline to identify UGMOs, a complete sequence of one GMO in the sample was unknown, mimicking a UGMO. All four GMOS in the sample were identified, thus proving the detection of UGMO.

ddPCR approach for multiplex quantification of 12 maize and 11 GM soybean in EU authorised GM lines

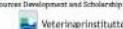


ALF: A novel genome walking for detection of unknown and unauthorised genetically modified organisms (UGMOs)



References: Jelenc, B.; Spilberg, B.; Bogozalec-Košir, A.; Holst-Jensen, A.; Žel, J.; Piel, O.; Kováč, 2015, 87 (15), R219-R226.
Bogozalec-Košir, A.; Spilberg, B.; Holst-Jensen, A.; Žel, J.; Dobnik, D.; Piel, O.; Kováč, 2016, 88 (15), R100-R107. Development and evaluation of a multiplex droplet digital PCR assay for simultaneous quantification of 25 genetically modified soybean lines. (in review)
Bogozalec-Košir, A.; Arnulandhu, A.; van Dijk, J.; Dobnik, D.; Piel, O.; Kováč, M.; Xiao, H.; Hagelaar, R.; Stuurman, M.; Costessi, A.; Žel, J.; Kok, E.; van Dijk, J.P.; ALF: A novel genome walking for detection of unknown, unauthorised genetically modified organisms (UGMOs). (in review)

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