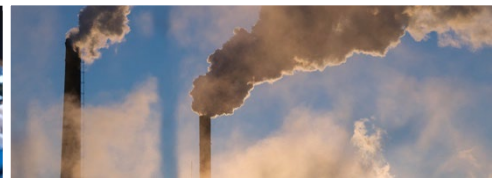
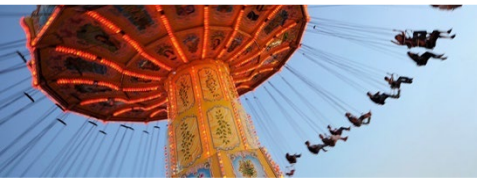


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Exploiting RNA interference to achieve target specific pest control via plant protection products

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Exponent International Limited

25th October 2022

Disclaimer

This statement is intended to clarify that the RNA interference technology as a tool for biological crop protection is currently not included within the scope of the IBMA definition of “Bioprotection”. Currently, IBMA does not include, within the scope of “Bioprotection”, any technology for which there is no regulatory pathway or policy decision. Once policy decisions have been published, the technologies will be considered for inclusion. The scope of the IBMA definition of “Bioprotection” is currently limited to semiochemicals, microbials, natural substances and invertebrate biocontrol agents (macrobials), as defined in the current IBMA policy document (as of October 2022).

Agenda

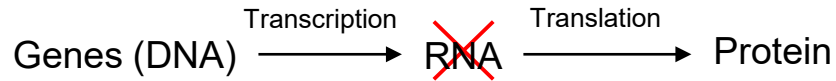
- Background
- Mode of action
- Reasons for adoption
- How to exploit
- Regulatory challenges (EU)
- Technical challenges
- How we can support

The big picture...

- Huge demand on global agriculture: global population is likely to hit approx. 9 billion by 2050 (OECD, 2012)
- Up to 40% of global crop production is lost to pests annually, costing the global economy over \$200 billion (FAO, 2021)
- Modern agriculture demands innovative tools in order to meeting global food challenges
- RNA interference (RNAi) adds to the growing arsenal of effective, safe and environmentally friendly crop protection technologies

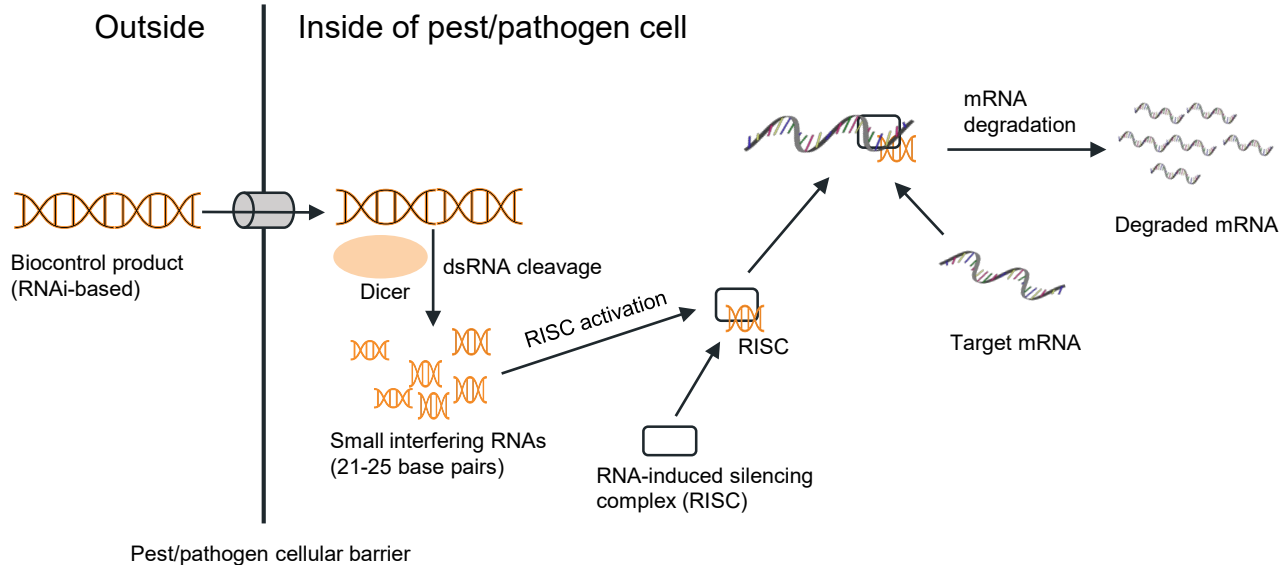
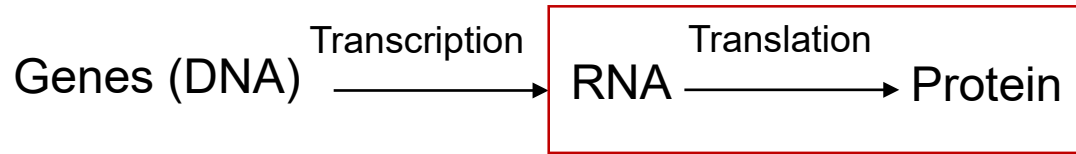
What is RNA interference (RNAi)?

- Central dogma of molecular biology (aka the genetic flow of information) where...



- RNAi is a biological process in which gene expression is suppressed by sequence specific RNA molecules
- Conventional chemicals sometimes target proteins
- RNAi is a mechanism already used by organisms in nature for viral defence

How does RNAi work?



Illustrative scheme of RNAi mode of action

Why should we use RNA interference?

- Conventional chemistry is facing greater challenges to pass approval criteria and risk assessments
- Increasing reports of resistance to currently approved active ingredients
- A responsibility within the industry and for regulators to ensure innovative science is translated to benefit all stakeholders

What are the potential benefits?

- Target specific pest control – no or minor effects on non-target organisms
- Adaptability - potential to respond to pest resistance by alternating targets sequences
- Improved safety for vertebrates
- Improved environmental profiles in soil, surface and ground water

How is RNAi exploited?

- Identify the sequences of a target pest's genome including regions that produce essential proteins
- Ensure these sequences are unique to the target pest by comparison of genome data with other organisms
- Design a molecule to target and suppress expression of the essential gene via a sequence unique to the target pest
- Formulate the molecule into a plant protection product
- Take the product through the respective regulatory processes in order to bring the technology to market

How could RNA technology be taken to market (EU)?

- Regulation (EC) No. 1107/2009 framework is applicable
- The current data-requirements (Reg. (EU) No. 283/2013 and 284/2013) do not extend comprehensively to RNA technology
- No EU-specific guidance document defining data requirements in place
- Currently strategies could be developed based on both chemical and microbial PPP data-requirements (case-by-case basis)
- Sound scientific waivers and exploitation of applicable genomic technologies such as bioinformatics can be very helpful

What are the challenges?

- Varying efficacy on insect species
- Other uses (herbicidal and fungicidal) still require development
- Development of bespoke/non-standard submission package is needed to support regulatory approval

What support can we offer?

- Identify the relevant legislation to commercialise the technology as a plant protection product
- Design the regulatory strategy and pathway to market
- Negotiate and agree on regulatory strategies with competent authorities
- Set up and monitor relevant regulatory studies to generate a comprehensive data-package
- Write the dossiers and perform the risk assessments for submission to competent authorities

Thank You

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