

RNAi-based control of the pollen beetle *Meligethes aeneus*: risk assessment of using trap crops as a delivery platform

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The pollen beetle, *Meligethes aeneus*, is a key insect pest of oilseed rape (OSR), *Brassica napus*, throughout Europe. Currently, insecticides are the primary means to control the pollen beetle, but in recent years, this insect has been observed to display widespread and high resistance to pyrethroids, which is the main insecticide class used against it. Novel and integrated strategies are necessary for improved and continuing pest control of the pollen beetle below economic thresholds. Molecular biology and genomics research provides a foundation of knowledge for a more informed approach to behavioral and ecological research. Very little, however, is known about the pollen beetle at the molecular/genomic level.

Currently work is being carried out on transcriptomics and functional genomics of the pollen beetle, including targeting various vital genes for RNA interference aiming at disruption of gene expression. Transgenic OSR is one approach in administering the RNAi product to the pollen beetle, but it may be a very lengthy and uncertain strategy in bringing this technology to the market, at least in Europe. An alternative is explored within the ERA-NET project IPM4Meligethes, focusing on feeding the pollen beetles with the appropriate dsRNA in the field. This could be done in an innovative way by using trap crops with exogenous dsRNA either in the spring (before maturity feeding of the female beetles), or in the autumn (before overwintering), depending on which vital gene(s) are targeted. Trap crops could be treated with the dsRNA-product either by spraying, or more elegantly, by using entomovectoring (honey bees or bumble bees). This would not involve using transgenic plants, which should facilitate an easier regulatory approval of the strategy.

Risk assessment to non-target organisms is mandatory also in this context. Variables in such an assessment include (i) the choice of trap crop plants, (ii) organisms visiting the trap crops and feeding on the pollen containing the dsRNA product, (iii) timing of application, and (iv) method of application. These variables will narrow the spectrum of non-target organisms that might be at risk, and which should be included in the safety assays.

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ROME ITALY



Wild type

RNAi

Grosshans H, Filipowicz W. *Nature*. 2008