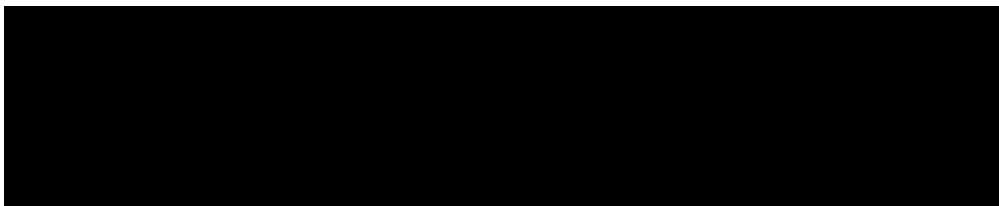


Annex 4

Review of literature of 281-24-236 x 3006-210-23 x MON 88913 cotton in the scope of the authorisation for food and feed uses, import and processing (2019 update)

Review of literature for 281-24-236 x 3006-210-23 and 281-24-236 x 3006-210-23 x MON 88913 cottons in the scope of their authorisations for food and feed uses, import and processing in the EU (2019 update)



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1. Summary

An updated systematic search and review of peer-reviewed literature in line with the EFSA Guidance on conducting a systematic review (EFSA, 2010) and taking into account the explanatory note on literature searching (EFSA, 2019), was conducted with the following review question “Does 281-24-236 x 3006-210-23 cotton or 281-24-236 x 3006-210-23 x MON 88913 cotton and derived food/feed products, or the intended traits (the newly expressed proteins or their combination) have adverse effects on human and animal health and the environment in the scope of their authorisation?”.

The review question and the search procedure took into account the product and scope of the authorisation (i.e., authorisation for import into the EU of food and feed containing, consisting of, or produced from 281-24-236 x 3006-210-23 or 281-24-236 x 3006-210-23 x MON 88913 cotton) and the objectives of the studies (i.e., assessment of potential adverse effects on human and animal health and the environment of the genetically modified food and feed containing, consisting of or produced from 281-24-236 x 3006-210-23 or 281-24-236 x 3006-210-23 x MON 88913 cotton). The systematic searches were performed according to the relevant parts of the EFSA guidance on the application of systematic review methodology to food and feed safety assessments (EFSA, 2010). The fundamental principles followed in this study were (1) methodological rigour and coherence in the retrieval and selection of studies; (2) transparency; and (3) reproducibility. Each search used a procedure that was developed *a priori*.

The systematic search and review of studies published in the scientific literature followed a tiered approach that included: (i) a systematic literature search, (ii) a screening of the retrieved records for relevance to the review question, and (iii) a thorough analysis of potential studies that were considered relevant, if any.

The current systematic search complements the searches previously performed in 2018. Unless outlined below, all portions of the search were conducted according to the methodologies outlined in the previous searches.

The outcome of this analysis showed that no new publications relevant for the review question were identified during the selected time period. No safety concerns were identified for 281-24-236 x 3006-210-23 or 281-24-236 x 3006-210-23 x MON 88913 cotton by this literature search exercise.

2. Eligibility/inclusion criteria

Search outputs were manually screened for relevance for the review question: “Does 281-24-236 x 3006-210-23 cotton or 281-24-236 x 3006-210-23 x MON 88913 cotton and derived food/feed products, or the intended traits (the newly expressed proteins or their combination) have adverse effects on human and animal health and the environment in the scope of their authorisation?”. Since the single events are not commercial products anywhere in the world, the applicant requested and obtained authorisation of the stack product which was assessed as described in the EFSA stack guidance (EFSA, 2007)¹. Specific data on the single events have been considered by EFSA in support of the risk assessment of the 281-24-236 x 3006-210-23 stack cotton (EFSA, 2010), and similarly are considered in the framework of this literature

¹ EFSA 2007: ‘Where events have been stacked in a plant, it is possible that neither of the individual events have been assessed previously, that one or more have, or that all of the events have undergone a risk assessment according to the EFSA Guidance Document.’ (emphasis added).

search review. The systematic search uses *a priori* determined eligibility/inclusion criteria indicated in Table 1.

Table 1: Eligibility/inclusion criteria to establish the relevance of retrieved publications based on the review question

Concept	Criteria
Population (taking into account scope of application)	Addressing human and animal health, and/or the environment relevant for the scope of the authorisation. The pathways and level of exposure to the GMO, derived food/feed products, and the intended traits addressed in the study (as assessed under the Intervention/exposure part) are relevant for the intended uses of the GMO and derived food/feed products under regulatory review (e.g. in case of an import application, efficacy of the traits, pest susceptibility, etc. are not considered relevant).
Intervention/exposure	281-24-236 x 3006-210-23 x MON 88913, 281-24-236 x 3006-210-23 cotton (or 281-24-236 or 3006-210-23, where relevant) and derived food/feed products, and/or the intended traits (the newly expressed protein(s) or their combination).
Intervention/exposure Plant species	In case of studies using GM plants, only studies using cotton are considered eligible. This criterion is not employed for studies regarding the newly expressed proteins.
Intervention/exposure Source organism of the protein	In case of publications using the protein of interest, only publications with the protein from the specific source organism will be considered eligible.
Comparator	If the study is a comparative study that uses plant material as test material, eligible publications must report a non-GM variety.
Outcomes	Effects/impacts on human and animal health, and/or the environment are addressed. Publications addressing other issues such as benefits, socio-economics, ethics, crop protection, detection methods, efficacy, public perception and risk communication are to be excluded using this criterion, as they are not relevant to the risk assessment of GMOs.
Reporting format	Original/primary data are presented in the study. This permits the exclusion of publications that do not present original/primary data (e.g., reviews, editorial, position papers). However, risk assessments from relevant risk assessment bodies (excluding EFSA) will not be excluded.

3. Confirmation of the Suitability of the Search Strings

The previous search strategies were analyzed to ensure that the original search terms were still relevant in the current search engine (described in Section 3.2 below).

3.1. Electronic bibliographic databases

Due to changes in subscriptions to electronic bibliographic databases, updated descriptions are provided below.

Web of Science™ Core collection²

Web of Science Core collection is one of the largest citation databases available with over 1.5 billion cited reference connections indexed from high quality peer reviewed journals, books and proceedings³. “Each cited reference is meticulously indexed to ensure that it is searchable and attributes credit to the appropriate publication”.⁴

CABI’s CAB Abstracts® and Global Health®⁵

CAB Abstracts gives you instant access to over 9.5 million record⁶, with over 350,000 abstracts added each year. Covering publications from over 120 countries in 50 languages, including a number of niche, independent journals, CAB Abstracts gives you the fullest global picture for any subject.⁷ This database also includes local publications.

Global Health gives researchers and students unparalleled access to all the world’s relevant public health research and practice – providing knowledge without borders. More than 3.3⁸ million records, dedicated to public health, with full text hosted for over 100,000 articles including 375 CABI book chapters, over 160 reviews from CABI’s very own eJournal CAB Reviews and over 500 news items from 2014 – 2018. New content added each week.⁹

MEDLINE¹⁰

MEDLINE is the U.S. National Library of Medicine® (NLM) premier bibliographic database that contains more than 25 million references to journal articles in life sciences with a concentration on biomedicine. A distinctive feature of MEDLINE is that the records are indexed with NLM Medical Subject Headings (MeSH®). MEDLINE is the online counterpart to MEDLARS® (MEDical Literature Analysis and Retrieval System) that originated in 1964. MEDLINE is the primary component of PubMed®.¹¹

The WoS search engine can access one or more databases depending on your subscription. Web of Science Core collection is an interdisciplinary database covering all sciences including life, physical, health and social sciences which is updated on a daily basis including with articles in press. CABI covers agriculture, environment, applied life sciences, veterinary sciences, applied economics, food science and nutrition. The subject scope of MEDLINE is biomedicine and health, broadly defined to encompass those areas of the life sciences, behavioral sciences, chemical sciences, and bioengineering needed by health professionals and others engaged in basic research and clinical care, public health, health policy development, or related educational activities.

The WoS search interfaces feature advanced search options which include the use of complex search syntaxes. In addition, Europe PMC (as previously described for 2018 searches) was used to complement these searches as the database allows full text searching of publications stored at Europe PMC.

² Web of Science is a trademark of Clarivate Analytics

³ <https://clarivate.com/products/web-of-science/web-science-form/web-science-core-collection/>; Last accessed 14 November 2019

⁴ https://clarivate.com/wp-content/uploads/2017/05/d6b7faae-3cc2-4186-8985-a6ecc8cce1ee_Crv_WoS_Upsell_Factbook_A4_FA_LR_edits.pdf; Last accessed 14 November 2019

⁵ CABI, CAB Abstracts, and Global Health are trademarks of C.A.B. International

⁶ Figures as of September 2019

⁷ As defined by CABI; <https://www.cabi.org/publishing-products/cab-abstracts/>; Last accessed 14 November 2019

⁸ Figures as of September 2019

⁹ As defined by CABI; <https://www.cabi.org/publishing-products/global-health/>; Last accessed 14 November 2019

¹⁰ MEDLINE is a trademark of U.S. National Library of Medicine

¹¹ <https://www.nlm.nih.gov/bsd/medline.html>; Last accessed 14 November 2019

Therefore, it was confirmed that the combination of these sources allows having a broad coverage of publications related to GMO risk assessment.

3.2. Web of Science Search Engine

The Web of Science Core Collection, CABI (CAB Abstracts and Global Health), and MEDLINE databases were accessed using the Web of Science search engine by Clarivate Analytics (referred to as WoS search engine). Search syntaxes were fine-tuned taking into account the specificities of the WoS search engine:

- Preference is given for using a dash (“-“) as the WoS search will recognise it as either a dash, a space or a comma. When a dash is utilized, quotation marks around the connected terms are no longer needed (e.g., "acetyl transferase" replaced by acetyl-transferase will retrieve both acetyl transferase and acetyl-transferase), except if there is undesired lemmatisation of the first part of the term.
- Lemmatisation is utilized in the WoS search engine and as thus, terms were evaluated to determine if it was most appropriate to use truncation with a wildcard symbol or to utilize the root word and the lemmatisation feature. For example, using the root term Stack returns results that also include the terms stacks, stacking, stacked. However, searching for the truncated term Stack* returns additional results that are not associated with the stack word, such as the Stackelberg model.

The different abstracting literature databases are searched individually using the WoS search engine in order to access all of the relevant fields. The employed search interfaces are used in a way so that each is searched more broadly than the title and abstract, also searching keywords (including indexing keywords, where applicable). For example, the topic search (TS) searches the following fields:

- Web of Science Core collection: Title; Abstract; Author Keywords; Keywords Plus¹²
- CABI: Abstract; BHTD Crital Abstract; Broad Descriptors; CABICODES Names; Descriptors; English Title; Foreign Title; Geographic Location; Identifiers; Organism Descriptors¹³
- MEDLINE: Title; Vernacular Title; Abstract; Other Abstract; MeSH Terms; Keyword List; Chemical; Gene Symbol; Personal Name Subject; Space Flight Mission¹⁴

In CABI, indexing terms are included in the Descriptor fields of the record and can be searched for utilising the topic search as described above. Web of Science Core collection does not utilize controlled vocabulary or thesaurus terms, therefore no further additions were made to the developed search string¹⁵.

It was observed that the symbol Ø used in the OECD identifier is sometimes replaced by empty-set, circle-divide, or < 0 > and therefore this was considered in the fine-tuning of the search strings (Appendix 1).

¹² http://images.webofknowledge.com/WOKRS532JR5/help/WOS/hs_topic.html; Last accessed 14 November 2019

¹³ http://images.webofknowledge.com/WOKRS532JR5/help/CABI/hs_topic.html; Last accessed 14 November 2019

¹⁴ http://images.webofknowledge.com/WOKRS532JR5/help/MEDLINE/hs_topic.html; Last accessed 14 November 2019

¹⁵ https://support.clarivate.com/ScientificandAcademicResearch/s/article/Web-of-Science-Core-Collection-No-controlled-vocabulary-or-thesaurus-in-assigning-subject-terms?language=en_US

3.3. Conclusions of the suitability of the search strategy

Introduced updates were for consistency or to fine tune the syntaxes to the databases queried. It was confirmed that searches on the single events would find results on the stack product. As the updated searches are as sensitive and not more specific than the previous searches, no additional validation was conducted.

4. Results of the literature search exercise

In December 2019, searches against electronic bibliographic databases and manual searches in view of screening of reference lists were performed. The search process is reported in line with EFSA guidance (EFSA, 2010 Appendix B4(2)) in Table 2.

Table 2. Documenting and reporting the search process

Resources	Date of search	Period searched*	Other restrictions	Number of records retrieved
Web of Science Core collection [§]	12 Dec 2019	2018-12 Dec 2019	None	292
CABI [§]	12 Dec 2019	2018-12 Dec 2019	None	213
MEDLINE [§]	12 Dec 2019	2018-12 Dec 2019	None	184
Europe PMC [§]	12 Dec 2019	2018-12 Dec 2019	None	5
Screening reference lists [^]	17 Dec 2019	-	2018-17 Dec 2019 [§]	0 **

[§] A justification for choosing these search interfaces/databases is provided in Section 3.1. The combination of these sources allows having a broad coverage of publications related to GMO risk assessment.

[§] The time period was applied post-hoc.

** Number of records screened on full text.

[^] No risk assessment opinions of the identified regulatory organisations concerning food and feed safety assessment specific for 281-24-236 x 3006-210-23 x MON 88913 or 281-24-236 x 3006-210-23 cotton, nor any reviews specifically addressing the safety of 281-24-236 x 3006-210-23 x MON 88913 or 281-24-236 x 3006-210-23 cotton were identified within the selected literature search period.

The publications retrieved across all methods of searching (Web of Science Core collection, CABI, Medline, Europe PMC, and screening of reference lists) can be found in Appendix 2. In the framework of the reference list screening exercise, no detailed risk assessments regarding the 281-24-236 x 3006-210-23 x MON 88913 or 281-24-236 x 3006-210-23 cotton nor any reviews were retrieved that contained information on food and feed safety. Considering that no opinions were published within the selected time period no further screening was performed.

The publications grouped in the Endnote® library were deduplicated. Publications retrieved by the previous searches conducted in the frame of the 2018 annual monitoring report for 281-24-236 x 3006-210-23 x MON 88913 and 281-24-236 x 3006-210-23 cottons were also removed (see Appendix 2, Section 6). The results of the publication selection process are presented in Table 3.

Table 3. Results of the publication selection process, for the review question

Review question: “Does 281-24-236 x 3006-210-23 cotton or 281-24-236 x 3006-210-23 x MON 88913 cotton and derived food/feed products, or the intended traits (the newly expressed proteins or their combination) have adverse effects on human and animal health and the environment in the scope of their authorisation?”	Number of records
Total number of publications retrieved after all searches of the scientific literature (excluding duplicates and publications retrieved by the previous searches conducted in the frame of the 2018 monitoring reports)	283
Number of publications excluded from the search results after rapid assessment for relevance based on title and abstract	283
Total number of full-text documents assessed in detail	0
Number of publications excluded from further consideration after detailed assessment for relevance based on full text	0
Total number of unobtainable/unclear publications	0
Total number of relevant publications	0

The 283 unique entries present in the Endnote database (Table 3) were manually screened for relevance to the review question by two independent reviewers using the a priori eligibility/inclusion criteria described in Table 1.

Entries that are deemed to be irrelevant based on title/abstract were not further retained. In cases where the title/abstract did not contain sufficient information, the publication was assessed for relevance at the level of the full text (as listed in Appendix 3). The reason for excluding a result from the second screening is documented and a justification for not further assessing a reference is provided in Table 3.2 in Appendix 3, if any.

No publications were considered relevant (see Appendix 3, Table 3.1). No unobtainable/unclear publications were identified (see Appendix 3, Table 3.3).

5. Conclusion

No publications were identified as relevant for the molecular characterisation, food/feed and environmental safety of the authorised cotton within the scope of the authorisations for the defined time period. No safety concerns have been identified for the authorised cotton by this literature search exercise.

References

- EFSA, **2010**. Application of systematic review methodology to food and feed safety assessments to support decision making. EFSA Journal 8(6):1637. [90 pp.].
- EFSA, **2019**. Explanatory note on literature searching conducted in the context of GMO applications for (renewed) market authorisation and annual post-market environmental monitoring reports on GMOs authorised in the EU market. EFSA supporting publication 2019:EN-1614. [62 pp.].

Appendix 1. Detailed search syntaxes for the authorised cotton events

Web of Science Core collection

Set	Search query
Event #1	TS=(DAS24236* OR DAS-24236 OR DAS-24236-5 OR 281-24-236 OR DAS21023* OR DAS-21023 OR DAS-21Ø23-5 OR DAS-21-circle-divide-23-5 OR DAS-21empty set23-5 OR 3006-210-23 OR 281-24-236x3006-210-23 OR DAS-24236-5xDAS-21Ø23-5 OR DAS-24236-5xDAS-21-circle-divide-23-5 OR DAS-24236-5xDAS-21empty-set23-5 OR *281x3006* OR WideStrike*)
Stack #2	TS=(DAS-24236-5xDAS-21Ø23-5xMON-88913-8 OR DAS-24236-5xDAS-21-circle-divide-23-5xMON-88913-8 OR DAS-24236-5xDAS-21empty-set23-5xMON-88913-8 OR 281-24-236x3006-210-23xMON88913 OR *281x3006x88913* OR *281x3006xMON*)
#3	#1 OR #2
Proteins #4	TS=((cry1f OR cry-1f OR cryif OR "cry-if" OR Cry1-f OR Cry-1-f OR (phosphinothricin AND (acetyltransferase OR acetyl-transferase)) OR (pat AND phosphinothricin) OR cry1Ac OR Cry1-Ac OR cry1a-c OR cryiAc OR Cryi-Ac OR cryia-c OR (cry AND (1Ac or 1-Ac or iAc or i-Ac))) AND (Streptomyces OR viridochromogenes OR Bacillus OR thuringiensis OR bt OR cotton OR gossypium OR hirsutum OR (((herbicid* AND (genetical* NEAR/3 modif*)) OR GMHT) AND (crop OR plant OR food OR feed)) OR gmo OR gmos OR lmo OR lmos OR gm OR ge OR stack))
Traits #5	TS=((lepidopter* OR bollworm* OR pectinophora OR gossypiella OR corn-earworm* OR sorghum-headworm* OR helicoverpa OR armigera OR tobacco-budworm* OR heliothis OR virescens OR glufosinate* OR gluphosinate* OR (liberty* AND herbicid*)) AND (toler* OR resist* OR protec*) AND (cotton OR gossypium OR hirsutum) AND (gmo OR gmos OR lmo OR lmos OR living-modified OR transgen* OR GMHT OR ((GM OR GE OR genetic*) NEAR/5 (modif* OR transform* OR manipul* OR engineer* OR stack))))
#6	#3 OR #4 OR #5
Reporting Period #7	PY=(2018-2100)
Final Results #8	#6 AND #7

CABI

Set	Search query
Event #1	TS=(DAS24236* OR DAS-24236 OR DAS-24236-5 OR 281-24-236 OR DAS21023* OR DAS-21023 OR DAS-21Ø23-5 OR DAS-21<o>23-5 OR 3006-210-23 OR 281-24-236x3006-210-23 OR DAS-24236-5xDAS-21Ø23-5 OR DAS-24236-5xDAS-21<o>23-5 OR *281x3006* OR WideStrike*)
Stack #2	TS=(DAS-24236-5xDAS-21Ø23-5xMON-88913-8 OR DAS-24236-5xDAS-21<o>23-5xMON-88913-8 OR 281-24-236x3006-210-23xMON88913 OR *281x3006x88913* OR *281x3006xMON*)
#3	#1 OR #2
Proteins #4	TS=((cry1f OR cry-1f OR cryif OR "cry-if" OR Cry1-f OR Cry-1-f OR (phosphinothricin AND (acetyltransferase OR acetyl-transferase)) OR (pat AND phosphinothricin) OR cry1Ac OR Cry1-Ac OR cry1a-c OR cryiAc OR Cryi-Ac OR cryia-c OR (cry AND (1Ac or 1-Ac or iAc or i-Ac))) AND (Streptomyces OR viridochromogenes OR Bacillus OR thuringiensis OR bt OR cotton OR gossypium OR hirsutum OR (((herbicid* AND (genetical* NEAR/3 modif*)) OR GMHT) AND (crop OR plant OR food OR feed)) OR lmo OR lmos OR ge OR "genetically engineered foods" OR stack))
Traits #5	TS=((lepidopter* OR bollworm* OR pectinophora OR gossypiella OR corn-earworm* OR sorghum-headworm* OR helicoverpa OR armigera OR tobacco-budworm* OR heliothis OR virescens OR glufosinate* OR gluphosinate* OR (liberty* AND herbicid*)) AND (toler* OR resist* OR protec*) AND (cotton OR gossypium OR hirsutum) AND (GMHT OR transgen* OR engineer* OR lmo or lmos OR ge OR manipul* OR transform* OR stack OR "genetically engineered foods"))
#6	#3 OR #4 OR #5
Reporting Period #7	PY=(2018-2100)
Final Results #8	#6 AND #7

MEDLINE

Set	Search query
Event #1	TS=(DAS24236* OR DAS-24236 OR DAS-24236-5 OR 281-24-236 OR DAS21023* OR DAS-21023 OR DAS-21Ø23-5 OR 3006-210-23 OR 281-24-236x3006-210-23 OR DAS-24236-5xDAS-21Ø23-5 OR *281x3006* OR WideStrike*)
Stack #2	TS=(DAS-24236-5xDAS-21Ø23-5xMON-88913-8 OR 281-24-236x3006-210-23xMON88913 OR *281x3006x88913* OR *281x3006xMON*)
#3	#1 OR #2
Proteins #4	TS=((cry1f OR cry-1f OR cryif OR "cry-if" OR Cry1-f OR Cry-1-f OR (phosphinothricin AND (acetyltransferase OR acetyl-transferase)) OR (pat AND phosphinothricin) OR cry1Ac OR Cry1-Ac OR cry1a-c OR cryiAc OR Cryi-Ac OR cryia-c OR (cry AND (1Ac or 1-Ac or iAc or i-Ac))) AND (Streptomyces OR viridochromogenes OR Bacillus OR thuringiensis OR bt OR cotton OR gossypium OR hirsutum OR (((herbicid* AND (genetical* NEAR/3 modif*)) OR GMHT) AND (crop OR plant OR food OR feed)) OR lmo OR lmos OR ge OR "Food, Genetically Modified" OR stack))
Traits #5	TS=((lepidopter* OR bollworm* OR pectinophora OR gossypiella OR corn-earworm* OR sorghum-headworm* OR helicoverpa OR armigera OR tobacco-budworm* OR heliothis OR virescens OR glufosinate* OR gluphosinate* OR (liberty* AND herbicid*)) AND (toler* OR resist* OR protec*) AND (cotton OR gossypium OR hirsutum) AND (GMHT OR transgen* OR engineer* OR lmo or lmos OR ge OR manipulac* OR transform* OR stack OR "Food, Genetically Modified"))
#6	#3 OR #4 OR #5
Reporting Period #7	PY=(2018-2100)
Final Results #8	#6 AND #7

Europe PMC

("DAS-24236-5xDAS-21Ø23-5xMON-88913-8" OR "281-24-236x3006-210-23xMON88913" OR 281x3006x88913 OR 281x3006xMON OR DAS24236 OR "DAS-24236" OR "281-24-236" OR DAS21023 OR "DAS-21023" OR DAS21Ø23 OR "DAS-21Ø23" OR "3006-210-23" OR "281-24-236x3006-210-23" OR "DAS-24236-5xDAS-21Ø23-5" OR 281x3006 OR WideStrike) AND (FIRST_PDATE:[2018-01-01 TO 2100-12-31])

Appendix 2. Entries retrieved by the performed searches to literature databases for the authorised cotton events within the indicated search period

Note: the numbering of the references in the different appendixes is independent of each other (e.g. a certain reference might be called EFSA 2018a in one appendix and EFSA 2018b in another)

1. Entries retrieved using Web of Science Core collection

- Abbas MST, 2018. Genetically engineered (modified) crops (*Bacillus thuringiensis* crops) and the world controversy on their safety. *Egyptian Journal of Biological Pest Control* 28, 12.
- Abdelgaffar H, Tague ED, Gonzalez HFC, Campagna SR and Jurat-Fuentes JL, 2019. Midgut metabolomic profiling of fall armyworm (*Spodoptera frugiperda*) with field-evolved resistance to Cry1F corn. *Insect Biochemistry and Molecular Biology* 106, 1-9.
- Abdelgaffar HM, Oppert C, Sun XC, Monserrate J and Jurat-Fuentes JL, 2019. Differential heliothine susceptibility to Cry1Ac associated with gut proteolytic activity. *Pesticide Biochemistry and Physiology* 153, 1-8.
- Ahmad S, Cheema HMN, Khan AA, Khan RSA and Ahmad JN, 2019. Resistance status of *Helicoverpa armigera* against Bt cotton in Pakistan. *Transgenic Research* 28, 199-212.
- Ai XY, Ren SW, Liu N, Huang LN and Liu XN, 2019. Transgenic tobacco expressing dsRNA of the arginine kinase gene exhibits enhanced resistance against *Helicoverpa armigera*. *Bulletin of Insectology* 72, 115-124.
- Akhtar MN and Farooq A, 2019. Predator Prey Interaction between Lepidopteran Pests and Coccinellids Insects of Cotton in Southern Punjab Pakistan. *Pakistan Journal of Zoology* 51, 583-589.
- Ali G, Abma-Henkens MHC, van der Werf W, Hemerik L and Vlak JM, 2018. Genotype assembly, biological activity and adaptation of spatially separated isolates of *Spodoptera litura* nucleopolyhedrovirus. *Journal of Invertebrate Pathology* 153, 20-29.
- Ali I, Shuai Z, Sajjad A, Rehman HMU and Cui JJ, 2018. Artificial diet based investigation on the impact of purified Cry1Ac, Cry1Fa and Cry2Ab on the survival and reproductive performance of adult green lacewing, *Chrysopa pallens* (Rambur) (Neuroptera: Chrysopidae). *Phytoparasitica* 46, 127-135.
- Ali I, Zhang S, Muhammad MS, Iqbal M and Cui JJ, 2018. Bt Proteins Have No Detrimental Effects on Larvae of the Green Lacewing, *Chrysopa pallens* (Rambur) (Neuroptera: Chrysopidae). *Neotropical Entomology* 47, 336-343.
- Ali S, Rana A, Zia MA, Khan SU, Iqbal A and Ali GM, 2018. TEMPORAL STATUS OF BT GENE EXPRESSION IN PAKISTANI COTTON. *Pakistan Journal of Agricultural Sciences* 55, 143-150.
- Alvarado DI, Vigil KIS, Jacobo ISB and Morenofierros L, 2019. *Bacillus thuringiensis* Cry1Ac toxin induces MAPKs activation and allergenic effects in intestinal and immune cells. *European Journal of Immunology* 49, 1356-1356.
- Anderson JA, Ellsworth PC, Faria JC, Head GP, Owen MDK, Pilcher CD, Shelton AM and Meissle M, 2019. Genetically Engineered Crops: Importance of Diversified Integrated Pest Management for Agricultural Sustainability. *Frontiers in Bioengineering and Biotechnology* 7, 14.
- Anjum R, Baloch MJ, Baloch GM and Chachar Q, 2019. SIGNIFICANCE OF CROSS COMBINATIONS FOR DEVELOPING Bt COTTON VARIETIES FOR OPTIMUM GENE (CRY1AC) EXPRESSION LEVEL REQUIRED FOR

- BETTER BOLLWORM CONTROL. *Journal of Animal and Plant Sciences* 29, 531-538.
- Archibald WR, Bradshaw JD, Golick DA, Wright RJ and Peterson JA, 2018. Nebraska Growers' and Crop Consultants' Knowledge and Implementation of Integrated Pest Management of Western Bean Cutworm. *Journal of Integrated Pest Management* 9, 7.
- Aziz E, Batool R, Akhtar W, Rehman S, Gregersen PL and Mahmood T, 2019. Expression analysis of the polyphenol oxidase gene in response to signaling molecules, herbivory and wounding in antisense transgenic tobacco plants. *3 Biotech* 9, 13.
- Bahar MH, Stanley J, Backhouse D, Mensah R, Del Socorro A and Gregg P, 2019. Survival of *Helicoverpa armigera* larvae on and Bt toxin expression in various parts of transgenic Bt cotton (Bollgard II) plants. *Entomologia Experimentalis Et Applicata* 167, 415-423.
- Bakhsh A, Dinc T, Hussain T, Demirel U, Aasim M and Caliskan ME, 2018. Development of transgenic tobacco lines with pyramided insect resistant genes. *Turkish Journal of Biology* 42, 174-186.
- Bengyella L, Yekwa EL, Iftikhar S, Nawaz K, Jose RC, Fonmboh DJ, Tambo E and Roy P, 2018. Global challenges faced by engineered *Bacillus thuringiensis* Cry genes in soybean (*Glycine max* L.) in the twenty-first century. *3 Biotech* 8, 15.
- Bilbo TR, Reay-Jones FPF, Reisig DD, Musser FR and Greene JK, 2018. Effects of Bt Corn on the Development and Fecundity of Corn Earworm (Lepidoptera: Noctuidae). *Journal of Economic Entomology* 111, 2233-2241.
- Bilbo TR, Reay-Jones FPF, Reisig DD and Greene JK, 2019. Susceptibility of Corn Earworm (Lepidoptera: Noctuidae) to Cry1A.105 and Cry2Ab2 in North and South Carolina. *Journal of Economic Entomology* 112, 1845-1857.
- Bilbo TR, Reay-Jones FPF, Reisig DD, Greene JK and Turnbull MW, 2019. Development, survival, and feeding behavior of *Helicoverpa zea* (Lepidoptera: Noctuidae) relative to Bt protein concentrations in corn ear tissues. *Plos One* 14, 25.
- Bird LJ, 2018. Pyrethroid and carbamate resistance in Australian *Helicoverpa armigera* (Lepidoptera: Noctuidae) from 2008 to 2015: what has changed since the introduction of Bt cotton? *Bulletin of Entomological Research* 108, 781-791.
- Boddupally D, Tamirisa S, Gundra SR, Vudem DR and Khareedu VR, 2018. Expression of hybrid fusion protein (Cry1Ac::ASAL) in transgenic rice plants imparts resistance against multiple insect pests. *Scientific Reports* 8, 10.
- Bohn T, 2018. Criticism of EFSA's scientific opinion on combinatorial effects of 'stacked' GM plants. *Food and Chemical Toxicology* 111, 268-274.
- Boonchaisri S, Rochfort S, Stevenson T and Dias DA, 2019. Recent developments in metabolomics-based research in understanding transgenic grass metabolism. *Metabolomics* 15, 19.
- Boonmee K, Thammasittirong SNR and Thammasittirong A, 2019. Molecular characterization of lepidopteran-specific toxin genes in *Bacillus thuringiensis* strains from Thailand. *3 Biotech* 9, 11.
- Botha AS, Erasmus A, du Plessis H and Van den Berg J, 2019. Efficacy of Bt Maize for Control of *Spodoptera frugiperda* (Lepidoptera: Noctuidae) in South Africa. *Journal of Economic Entomology* 112, 1260-1266.
- Bowling AJ, Sopko MS, Tan SY, Larsen CM, Pence HE and Zack MD, 2019. Insecticidal Activity of a Vip3Ab1 Chimera Is Conferred by Improved Protein Stability in the Midgut of *Spodoptera eridania*. *Toxins* 11, 17.
- Braswell LR, Reisig DD, Sorenson CE and Collins GD, 2019. *Helicoverpa zea*

- (Lepidoptera: Noctuidae) Preference for Plant Structures, and Their Location, Within Bt Cotton Under Different Nitrogen and Irrigation Regimes. *Journal of Economic Entomology* 112, 1741-1751.
- Braswell LR, Reisig DD, Sorenson CE and Collins GD, 2019. *Helicoverpa zea* (Lepidoptera: Noctuidae) Oviposition and Larval Vertical Distribution in Bt Cotton Under Different Levels of Nitrogen and Irrigation. *Journal of Economic Entomology* 112, 1237-1250.
- Braswell LR, Reisig DD, Sorenson CE and Collins GD, 2019. Development and Dispersal of *Helicoverpa zea* (Lepidoptera: Noctuidae) on Non-Bt and Bt Pyramided Cotton. *Environmental Entomology* 48, 465-477.
- Brown ZS, 2018. VOLUNTARY PROGRAMS TO ENCOURAGE REFUGES FOR PESTICIDE RESISTANCE MANAGEMENT: LESSONS FROM A QUASI-EXPERIMENT. *American Journal of Agricultural Economics* 100, 844-867.
- Campos SO, Santana IV, Silva C, Santos-Amaya OF, Guedesa RNC and Pereira EJG, 2019. Bt-induced hormesis in Bt-resistant insects: Theoretical possibility or factual concern? *Ecotoxicology and Environmental Safety* 183, 8.
- Carolina GMD, Reyes FC, Gonzalez-Vazquez VM, Garcia-Martinez O, Aguirre-Uribe LA, Tiscareno-Iracheta MA, Aguilar-Gonzalez CN and Rodriguez-Herrera R, 2018. Populations of *Heliothis virescens* (Fabricius, 1777) and *Helicoverpa zea* (Boddie, 1850) (LEPIDOPTERA: NOCTUIDAE) associated with transgenic and non-transgenic cotton and its resistance to the toxin BT. *Revista Bio Ciencias* 5, 19.
- Carriere Y, Degain BA, Unnithan GC, Harpold VS, Heuberger S, Li XC and Tabashnik BE, 2018. Effects of seasonal changes in cotton plants on the evolution of resistance to pyramided cotton producing the Bt toxins Cry1Ac and Cry1F in *Helicoverpa zea*. *Pest Management Science* 74, 627-637.
- Carriere Y, Williams JL, Crowder DW and Tabashnik BE, 2018. Genotype-specific fitness cost of resistance to Bt toxin Cry1Ac in pink bollworm. *Pest Management Science* 74, 2496-2503.
- Carriere Y, Yelich AJ, Degain B, Harpold VS, Unnithan GC, Kim JH, Mathew LG, Head GP, Rathore KS, Fabrick JA and Tabashnik BE, 2019. Gossypol in cottonseed increases the fitness cost of resistance to Bt cotton in pink bollworm. *Crop Protection* 126, 8.
- Chandrasena DI, Signorini AM, Abratti G, Storer NP, Olaciregui ML, Alves AP and Pilcher CD, 2018. Characterization of field-evolved resistance to *Bacillus thuringiensis*-derived Cry1F-endotoxin in *Spodoptera frugiperda* populations from Argentina. *Pest Management Science* 74, 746-754.
- Chen L, Wei JZ, Liu C, Zhang WN, Wang BJ, Niu LL and Liang GM, 2018. Specific Binding Protein ABCC1 Is Associated With Cry2Ab Toxicity in *Helicoverpa armigera*. *Frontiers in Physiology* 9, 11.
- Chen WB, Liu CX, Lu GQ, Chen HM, She ZC and Wu KM, 2018. Effects of Vip3AcAa+Cry1Ac Cotton on Midgut Tissue in *Helicoverpa armigera* (Lepidoptera: Noctuidae). *Journal of Insect Science* 18, 6.
- Chen XM, Gao TT, Peng Q, Zhang J, Chai YR and Song FP, 2018. Novel Cell Wall Hydrolase Cw1C from *Bacillus thuringiensis* Is Essential for Mother Cell Lysis. *Applied and Environmental Microbiology* 84, 14.
- Chen Y, Li YB, Zhou MY, Rui QZ, Cai ZZ, Zhang X, Chen Y and Chen DH, 2018. Nitrogen (N) Application Gradually Enhances Boll Development and Decreases Boll Shell Insecticidal Protein Content in N-Deficient Cotton. *Frontiers in Plant Science* 9, 10.
- Chen WB, Yang XW, Tetreau G, Song XZ, Coutu C, Hegedus D, Blissard G, Fei ZJ and

- Wang P, 2019. A high-quality chromosome-level genome assembly of a generalist herbivore, *Trichoplusia ni*. *Molecular Ecology Resources* 19, 485-496.
- Chen Y, Li YB, Zhou MY, Cai ZZ, Tambel LIM, Zhang X, Chena Y and Chen D, 2019. Nitrogen deficit decreases seed Cry1Ac endotoxin expression in Bt transgenic cotton. *Plant Physiology and Biochemistry* 141, 114-121.
- Da Silva IHS, Gomez I, Sanchez J, de Castro DLM, Valicente FH, Soberon M, Polanczyk RA and Bravo A, 2018. Identification of midgut membrane proteins from different instars of *Helicoverpa armigera* (Lepidoptera: Noctuidae) that bind to Cry1Ac toxin. *Plos One* 13, 16.
- da Silva G, Ramos LFC, Seckler HD, Gomes FM, Cortines JR, Ramos I, Anobom CD, Machado ED and de Oliveira DMP, 2019. Biochemical characterization of digestive membrane-associated alkaline phosphatase from the velvet bean caterpillar *Anticarsia gemmatilis*. *Archives of Insect Biochemistry and Physiology* 102, 14.
- de Assis VCB, Chagas PG, Marinho CGS, Fadini MAM, Delabie JHC and Mendes SM, 2018. Transgenic Bt maize does not affect the soil ant community. *Pesquisa Agropecuaria Brasileira* 53, 152-162.
- de Bortoli CP and Jurat-Fuentes JL, 2019. Mechanisms of resistance to commercially relevant entomopathogenic bacteria. *Current opinion in insect science* 33, 56-62.
- De Paulo PD, Fadini MAM, Marinho CGS and Mendes SM, 2019. DIRECT DEFENSE ELICITED BY *Tetranychus urticae* KOCH (Acari: Tetranychidae) IN Bt MAIZE PLANTS. *Bioscience Journal* 35, 903-909.
- Deng JX, Wang YM, Yang FY, Liu Y and Liu B, 2019. Persistence of insecticidal Cry toxins in Bt rice residues under field conditions estimated by biological and immunological assays. *Science of the Total Environment* 679, 45-51.
- Dhanaraj AL, Willse AR and Kamath SP, 2019. Stability of expression of Cry1Ac and Cry2Ab2 proteins in Bollgard-II hybrids at different stages of crop growth in different genotypes across cropping seasons and multiple geographies. *Transgenic Research* 28, 33-50.
- Dhanika NK, Chauhan VK, Chaitanya RK and Dutta-Gupta A, 2019. Midgut de novo transcriptome analysis and gene expression profiling of *Achaea janata* larvae exposed with *Bacillus thuringiensis* (Bt)-based biopesticide formulation. *Comparative Biochemistry and Physiology D-Genomics & Proteomics* 30, 81-90.
- Ding LP, Chen YJ, Wang HZ and Wei JH, 2018. Efficacy of Cry1Ac protein against gypsy moth and fall webworm in transgenic poplar (*Populus davidiana* x *Populus bolleana*) by bioassay. *Canadian Journal of Plant Science* 98, 844-850.
- Ding RF, Ma DY, Uwais A, Wang DM, Liu J, Xu Y, Li HB, Li HQ and Pan HS, 2019. Transgenic Cry1Ac cotton does not affect the development and fecundity of *Chrysoperla carnea*. *Plos One* 14, 12.
- Dominguez-Mendez R, Alcantara-de la Cruz R, Rojano-Delgado AM, da Silveira HM, Portugal J, Cruz-Hipolito HE and De Prado R, 2019. Stacked traits conferring multiple resistance to imazamox and glufosinate in soft wheat. *Pest Management Science* 75, 648-657.
- Dong S, Liu Y, Zhang X, Xu CX, Liu XJ and Zhang CZ, 2019. Development of an immunochromatographic assay for the specific detection of *Bacillus thuringiensis* (Bt) Cry1Ab toxin. *Analytical biochemistry* 567, 1-7.
- Eghrari K, de Brito AH, Baldassi A, Balbuena TS, Fernandes OA and Moro GV, 2019. Homozygosis of Bt locus increases Bt protein expression and the control of *Spodoptera frugiperda* (Lepidoptera: Noctuidae) in maize hybrids. *Crop Protection* 124, 7.

- Eisenring M, Naranjo SE, Bacher S, Abbott A, Meissle M and Romeis J, 2019. Reduced caterpillar damage can benefit plant bugs in Bt cotton. *Scientific Reports* 9, 9.
- Erlandson MA, Toprak U and Hegedus DD, 2019. Role of the peritrophic matrix in insect-pathogen interactions. *Journal of insect physiology* 117, 11.
- Fand BB, Nagrare S, Gawande SP, Nagrale UT, Naikwadi BV, Deshmukh V, Gokte-Narkhedkar N and Waghmare VN, 2019. Widespread infestation of pink bollworm, *Pectinophora gossypiella* (Saunders) (Lepidoptera: Gelechiidae) on Bt cotton in Central India: a new threat and concerns for cotton production. *Phytoparasitica* 47, 313-325.
- Ferreira ACD, Bogiani JC, Sofiatti V and da Silva JL, 2018. Chemical control of stalk regrowth in glyphosate-resistant transgenic cotton. *Revista Brasileira de Engenharia Agricola e Ambiental* 22, 530-534.
- Figueiredo CS, Lemes ARN, Sebastiao I and Desiderio JA, 2019. Synergism of the *Bacillus thuringiensis* Cry1, Cry2, and Vip3 Proteins in *Spodoptera frugiperda* Control. *Applied Biochemistry and Biotechnology* 188, 798-809.
- Flagel L, Lee YW, Wanjugi H, Swarup S, Brown A, Wang JL, Kraft E, Greenplate J, Simmons J, Adams N, Wang YF, Martinelli S, Haas JA, Gowda A and Head G, 2018. Mutational disruption of the ABCC2 gene in fall armyworm, *Spodoptera frugiperda*, confers resistance to the Cry1Fa and Cry1A.105 insecticidal proteins. *Scientific Reports* 8, 11.
- Fleming D, Musser F, Reisig D, Greene J, Taylor S, Parajulee M, Lorenz G, Catchot A, Gore J, Kerns D, Stewart S, Boykin D, Caprio M and Little N, 2018. Effects of transgenic *Bacillus thuringiensis* cotton on insecticide use, heliothine counts, plant damage, and cotton yield: A meta-analysis, 1996-2015. *Plos One* 13, 27.
- Fritz ML, DeYonke AM, Papanicolaou A, Micinski S, Westbrook J and Gould F, 2018. Contemporary evolution of a Lepidopteran species, *Heliothis virescens*, in response to modern agricultural practices. *Molecular Ecology* 27, 167-181.
- Fu JM, Song XL, Liu B, Shi Y, Shen WJ, Fang ZX and Zhang L, 2018. Fitness Cost of Transgenic cry1Ab/c Rice Under Saline-Alkaline Soil Condition. *Frontiers in Plant Science* 9, 13.
- Gao MJ, Wang XM, Yang YH, Tabashnik BE and Wu YD, 2018. Epistasis confers resistance to Bt toxin Cry1Ac in the cotton bollworm. *Evolutionary Applications* 11, 809-819.
- Gao MJ, Liu Y, Wang Y, Zhang X, Dong S and Liu XJ, 2019. Newly identified APN splice isoforms suggest novel splicing mechanisms may underlie circRNA circularization in moth. *Febs Open Bio* 9, 1521-1535.
- Garcia AG, Ferreira CP, Godoy WAC and Meagher RL, 2019. A computational model to predict the population dynamics of *Spodoptera frugiperda*. *Journal of Pest Science* 92, 429-441.
- Gartia J, Barnwal RP, Anangi R, Giri AR, King G and Chary KVR, 2019. H-1, C-13 and N-15 NMR assignments of two plant protease inhibitors (IRD7 and IRD12) from the plant *Capsicum annuum*. *Biomolecular NMR assignments* 13, 31-35.
- Geng LL, Xu D, Zhang MH, Shu CL, Feng JH, Song FP, Lu F and Zhang J, 2018. High-throughput Sequencing-based Analysis of the Intestinal Microbiota of Broiler Chickens Fed Genetically Modified Rice Expressing Cry1Ac/Cry1Ab Chimeric *Bacillus thuringiensis* Protein. *Journal of Poultry Science* 55, 10-16.
- Grimi DA, Parody B, Ramos ML, Machado M, Ocampo F, Willse A, Martinelli S and Head G, 2018. Field-evolved resistance to Bt maize in sugarcane borer (*Diatraea saccharalis*) in Argentina. *Pest Management Science* 74, 905-913.

- Grizanova EV, Krytsyna TI, Surcova VS and Dubovskiy IM, 2019. The role of midgut nonspecific esterase in the susceptibility of *Galleria mellonella* larvae to *Bacillus thuringiensis*. *Journal of Invertebrate Pathology* 166, 3.
- Guan RB, Chen QY, Li HC, Hu SR, Miao XX, Wang GR and Yang B, 2019. Knockout of the HaREase Gene Improves the Stability of dsRNA and Increases the Sensitivity of *Helicoverpa armigera* to *Bacillus thuringiensis* Toxin. *Frontiers in Physiology* 10, 11.
- Guo WC, Bai C, Wang ZA, Wang P, Fan Q, Mi XX, Wang L, He J, Pang JH, Luo XL, Fu WD, Tian YC, Si HJ, Zhang GL and Wu JH, 2018. Double-Stranded RNAs High-Efficiently Protect Transgenic Potato from *Leptinotarsa decemlineata* by Disrupting Juvenile Hormone Biosynthesis. *Journal of Agricultural and Food Chemistry* 66, 11990-11999.
- Guo W, Kain W and Wang P, 2019. Effects of disruption of the peritrophic membrane on larval susceptibility to Bt toxin Cry1Ac in cabbage loopers. *Journal of insect physiology* 117, 6.
- Guo ZJ, Sun D, Kang S, Zhou JL, Gong LJ, Qin JY, Guo L, Zhu LH, Bai Y, Luo L and Zhang YJ, 2019. CRISPR/Cas9-mediated knockout of both the PxABCC2 and PxABCC3 genes confers high-level resistance to *Bacillus thuringiensis* Cry1Ac toxin in the diamondback moth, *Plutella xylostella* (L.). *Insect Biochemistry and Molecular Biology* 107, 31-38.
- Gutha LR, Purushottam D, Veeramachaneni A, Tigulla S, Kodappully V, Enjala C, Rajput H, Anderson J, Hong B, Schmidt J and Bagga S, 2018. Expression of endogenous proteins in maize hybrids in a multi-location field trial in India. *Transgenic Research* 27, 331-342.
- Gutierrez AP, 2018. Hybrid Bt cotton: a stranglehold on subsistence farmers in India. *Current Science* 115, 2206-2210.
- Han C, Liu B and Zhong W, 2018. Effects of transgenic Bt rice on the active rhizospheric methanogenic archaeal community as revealed by DNA-based stable isotope probing. *Journal of applied microbiology* 125, 1094-1107.
- Hao J, Li YH, Wang JX, Xu CX, Gao MJ, Chen W, Zhang X, Hu XD, Liu Y and Liu XJ, 2020. Screening and activity identification of an anti-idiotypic nanobody for Bt Cry1F toxin from the camelid naive antibody phage display library. *Food and Agricultural Immunology* 31, 16.
- Haridas CV and Tenhumberg B, 2018. Modeling effects of ecological factors on evolution of polygenic pesticide resistance. *Journal of Theoretical Biology* 456, 224-232.
- Hazarika N, Boruah RR, Handique PJ, Acharjee S and Sarmah BK, 2019. Reconstruction and validation of three different binary vectors suitable for generation of genetically engineered *Helicoverpa* protected crops. *Indian Journal of Genetics and Plant Breeding* 79, 104-108.
- Herman RA, Ekmay RD, Schafer BW, Song P, Fast BJ, Papineni S, Shan G and Juberg DR, 2018. Food and feed safety of DAS-444epmt1 set6-6 herbicide-tolerant soybean. *Regulatory Toxicology and Pharmacology* 94, 70-74.
- Hernandez-Juarez A, Aguirre LA, Cerna E, Landeros J, Fries GA, Flores M and Ochoa YM, 2018. Effect of Transgenic Maize on Abundance of the Corn Flea Beetle, *Chaetocnema pulicaria* Melsheimer, as a Non-Target Pest. *Southwestern Entomologist* 43, 841-846.
- Herrero MI, Fogliata SV, Vera A, Casmuz A, Gomez DS, Castagnaro AP, Gastaminza G and Murua MG, 2018. Biological characterization and mating compatibility of *Helicoverpa gelatopoeon* (D.) (Lepidoptera: Noctuidae) populations from different

- regions in Argentina. *Bulletin of Entomological Research* 108, 108-115.
- Herrero MI, Fogliata SV, Dami LC, Casmuz A, Gastaminza G and Murua MG, 2019. Lack of reproductive isolation in *Helicoverpa gelatopoeon* (Lepidoptera: Noctuidae) populations from different host plant species in Argentina. *Florida Entomologist* 102, 291-297.
- Hilbeck A, Defarge N, Bohn T, Krautter M, Conradin C, Amiel C, Panoff JM and Trtikova M, 2018. Impact of Antibiotics on Efficacy of Cry Toxins Produced in Two Different Genetically Modified Bt Maize Varieties in Two Lepidopteran Herbivore Species, *Ostrinia nubilalis* and *Spodoptera littoralis*. *Toxins* 10, 17.
- Hiltpold I and Hibbard BE, 2018. Indirect Root Defenses Cause Induced Fitness Costs in Bt-Resistant Western Corn Rootworm. *Journal of Economic Entomology* 111, 2349-2358.
- Hu Q, Min L, Yang XY, Jin SX, Zhang L, Li YY, Ma YZ, Qi XW, Li DQ, Liu HB, Lindsey K, Zhu LF and Zhang XL, 2018. Laccase GhLac1 Modulates Broad-Spectrum Biotic Stress Tolerance via Manipulating Phenylpropanoid Pathway and Jasmonic Acid Synthesis. *Plant physiology* 176, 1808-1823.
- Hu XD, Zhang X, Zhong JF, Liu Y, Zhang CZ, Xie YJ, Lin MM, Xu CX, Lu LN, Zhu Q and Liu XJ, 2018. Expression of Cry1Ac toxin-binding region in *Plutella xylostella* cadherin-like receptor and studying their interaction mode by molecular docking and site-directed mutagenesis. *International Journal of Biological Macromolecules* 111, 822-831.
- Huang CW, Chen WJ, Ke X, Li YH and Luan YX, 2019. A multi-generational risk assessment of Cry1F on the non-target soil organism *Folsomia candida* (Collembola) based on whole transcriptome profiling. *Peerj* 7, 18.
- Hussain T, Aksoy E, Caliskan ME and Bakhsh A, 2019. Transgenic potato lines expressing hairpin RNAi construct of molting-associated EcR gene exhibit enhanced resistance against Colorado potato beetle (*Leptinotarsa decemlineata*, Say). *Transgenic Research* 28, 151-164.
- Hussain T, Zia K, Arif MJ and Javed N, 2019. Varietal Expression of Cry1Ac in Cotton and its Concentration Effect on *Helicoverpa armigera* under Laboratory Conditions. *International Journal of Agriculture and Biology* 21, 577-582.
- Ijaz M and Shad SA, 2018. Inheritance mode and realized heritability of resistance to imidacloprid in *Oxycarenus hyalinipennis* Costa (Hemiptera: Lygaeidae). *Crop Protection* 112, 90-95.
- Ingber DA, Mason CE and Flexner L, 2018. Cry1 Bt Susceptibilities of Fall Armyworm (Lepidoptera: Noctuidae) Host Strains. *Journal of Economic Entomology* 111, 361-368.
- Iqbal N, Manalil S, Chauhan BS and Adkins SW, 2019. Glyphosate-tolerant cotton in Australia: successes and failures. *Archives of Agronomy and Soil Science* 65, 1536-1553.
- Istkhar and Chaubey AK, 2018. Challenging the larvae of *Helicoverpa armigera* and assessing the immune responses to nematode-bacterium complex. *Phytoparasitica* 46, 75-87.
- Jerga A, Evdokimov AG, Moshiri F, Haas JA, Chen M, Clinton W, Fu XR, Halls C, Jimenez-Juarez N, Kretzler CN, Panosian TD, Pleau M, Roberts JK, Rydel TJ, Salvador S, Sequeira R, Wang YF, Zheng MY and Baum JA, 2019. Disabled insecticidal proteins: A novel tool to understand differences in insect receptor utilization. *Insect Biochemistry and Molecular Biology* 105, 79-88.
- Jin L, Wang J, Guan F, Zhang JP, Yu S, Liu SY, Xue YY, Li LL, Wu SW, Wang XL, Yang

- YH, Abdelgaffar H, Jurat-Fuentes JL, Tabashnik BE and Wu YD, 2018. Dominant point mutation in a tetraspanin gene associated with field-evolved resistance of cotton bollworm to transgenic Bt cotton. *Proceedings of the National Academy of Sciences of the United States of America* 115, 11760-11765.
- Jin MH, Liao CY, Chakrabarty S, Wu KM and Xiao YT, 2019. Comparative Proteomics of Peritrophic Matrix Provides an Insight into its Role in Cry1Ac Resistance of Cotton Bollworm *Helicoverpa armigera*. *Toxins* 11, 14.
- Jones CM, Parry H, Tay WT, Reynolds DR and Chapman JW, 2019. Movement Ecology of Pest *Helicoverpa*: Implications for Ongoing Spread. In: *Annual Review of Entomology*, Vol 64. Ed Douglas AE. Annual Reviews, Palo Alto, 277-295.
- Kahn TW, Chakraborty M, Williams J, Walsh T, James B, Monserrate J and Ferre J, 2018. Efficacy and Resistance Management Potential of a Modified Vip3C Protein for Control of *Spodoptera frugiperda* in Maize. *Scientific Reports* 8, 11.
- Kaur G, Guo JG, Brown S, Head GP, Price PA, Paula-Moraes S, Ni XZ, Dimase M and Huang F, 2019. Field-evolved resistance of *Helicoverpa zea* (Boddie) to transgenic maize expressing pyramided Cry1A.105/Cry2Ab2 proteins in northeast Louisiana, the United States. *Journal of Invertebrate Pathology* 163, 11-20.
- Kennedy RD, Cheavegatti-Gianotto A, de Oliveira WS, Lirette RP and Hjelle JJ, 2018. A General Safety Assessment for Purified Food Ingredients Derived From Biotechnology Crops: Case Study of Brazilian Sugar and Beverages Produced From Insect-Protected Sugarcane. *Frontiers in Bioengineering and Biotechnology* 6, 8.
- Khabbazi SD, Khabbazi AD, Ozcan SF, Bakhsh A, Basalma D and Ozcan S, 2018. Expression of GNA and biting site-restricted cry1Ac in cotton; an efficient attribution to insect pest management strategies. *Plant Biotechnology Reports* 12, 273-282.
- Khaing MM, Yang XM, Zhao M, Zhang WN, Wang BJ, Wei JZ and Liang GM, 2018. Effects of antibiotics on biological activity of Cry1Ac in Bt-susceptible and Bt-resistant *Helicoverpa armigera* strains. *Journal of Invertebrate Pathology* 151, 197-200.
- Khan MI, Khan AA, Cheema HMN and Khan RSA, 2018. Spatio-Temporal and Intra-Plant Expression Variability of Insecticidal Gene&IT (Cry1Ac) &ITin Upland Cotton. *International Journal of Agriculture and Biology* 20, 715-722.
- Kim JH, Lee SY, Kim WJ, Choi JY, Kim ST, Lee SH, Fang Y, Park DH, Park MG, Woo RM, Lee BR, Kim YS, Kim JK and Je YH, 2018. Resistance of transgenic rice events (rbcS:cry1Ac) against three lepidopteran rice pests. *Journal of Asia-Pacific Entomology* 21, 645-650.
- Kukanur VS, Singh TVK, Kranthi KR and Andow DA, 2018. Cry1Ac resistance allele frequency in field populations of *Helicoverpa armigera* (Hubner) collected in Telangana and Andhra Pradesh, India. *Crop Protection* 107, 34-40.
- Kumar R, Choudhary A, Kumar S and Shivangi, 2019. Frequency of alleles conferring resistance to Bt cotton in North Zone populations of the spotted bollworm, *Earias insulana* (Boisduval). *African Entomology* 27, 58-65.
- Leite NA, Pereira RM, Durigan MR, Amado D, Fatochetto J, Medeiros FCL and Omoto C, 2018. Susceptibility of Brazilian Populations of *Helicoverpa armigera* and *Helicoverpa zea* (Lepidoptera: Noctuidae) to Vip3Aa20. *Journal of Economic Entomology* 111, 399-404.
- Li Z, Wang XH, Saurav PS, Li CX, Zhao M, Xin SR, Parajulee MN and Chen FJ, Impacts of Bt maize inoculated with rhizobacteria on development and food utilization of *Mythimna separata*. *Journal of Applied Entomology* 10.

- Li P, Li YC, Shi JL, Yu ZB, Pan AH, Tang XM and Ming F, 2018. Impact of transgenic Cry1Ac+CpTI cotton on diversity and dynamics of rhizosphere bacterial community of different root environments. *Science of the Total Environment* 637, 233-243.
- Li R, Shi JX, Liu BA, Zhang DB, Zhao XX and Yang LT, 2018. International collaborative ring trial of four gene-specific loop-mediated isothermal amplification assays in GMO analysis. *Food Control* 84, 278-283.
- Li SY, Wang ZY, Zhou YY, Li CH, Wang GP, Wang H, Zhang J, Liang GM and Lang ZH, 2018. Expression of &ITcry2Ah1 &ITand two domain II mutants in transgenic tobacco confers high resistance to susceptible and Cry1Ac-resistant cotton bollworm. *Scientific Reports* 8, 11.
- Li XD, Zhao F, Qiu XF, Ren XM, Mo XT, Ding XZ, Xia LQ and Sun YJ, 2018. The full-length Cry1Ac protoxin without proteolytic activation exhibits toxicity against insect cell line CF-203. *Journal of Invertebrate Pathology* 152, 25-29.
- Li Z, Parajulee MN and Chen FJ, 2018. Influence of elevated CO₂ on development and food utilization of armyworm *Mythimna separata* fed on transgenic Bt maize infected by nitrogen-fixing bacteria. *Peerj* 6, 26.
- Li ZL, Bu NS, Chen XP, Cui J, Xiao MQ, Song ZP, Nie M and Fang CM, 2018. Soil incubation studies with Cry1Ac protein indicate no adverse effect of Bt crops on soil microbial communities. *Ecotoxicology and Environmental Safety* 152, 33-41.
- Li R, Yang SS, Qiu XF, Lu XQ, Hu QF, Ren XM, Wu BB, Qi LL, Ding XZ, Xia LQ and Sun YJ, 2019. The conserved cysteine residues in *Bacillus thuringiensis* Cry1Ac protoxin are not essential for the bipyramidal crystal formation. *Journal of Invertebrate Pathology* 163, 82-85.
- Li SY, Hussain F, Unnithan GC, Dong SL, UlAbdin Z, Gu SH, Mathew LG, Fabrick JA, Ni XZ, Carriere Y, Tabashnik BE and Li XC, 2019. A long non-coding RNA regulates cadherin transcription and susceptibility to Bt toxin Cry1Ac in pink bollworm, *Pectinophora gossypiella*. *Pesticide Biochemistry and Physiology* 158, 54-60.
- Li X, Ouyang XF, Zhang ZS, He L, Wang Y, Li YH, Zhao J, Chen Z, Wang CN, Ding LL, Pei Y and Xiao YH, 2019. Over-expression of the red plant gene R1 enhances anthocyanin production and resistance to bollworm and spider mite in cotton. *Molecular Genetics and Genomics* 294, 469-478.
- Liao JY, Xue YQ, Xiao GJ, Xie M, Huang ST, You SJ, Wyckhuys KAG and You MS, 2019. Inheritance and fitness costs of resistance to *Bacillus thuringiensis* toxin Cry2Ad in laboratory strains of the diamondback moth, *Plutella xylostella* (L.). *Scientific Reports* 9, 8.
- Little NS, Elkins BH, Mullen RM, Perera OP, Parys KA, Allen KC and Boykin DL, 2019. Differences between two populations of bollworm, *Helicoverpa zea* (Lepidoptera: Noctuidae), with variable measurements of laboratory susceptibilities to Bt toxins exposed to non-Bt and Bt cottons in large field cages. *Plos One* 14, 16.
- Liu J, Wang LC, Zhou GN, Gao SH, Sun TH, Liu JX and Gao BJ, Midgut transcriptome analysis of *Clostera anachoreta* treated with lethal and sublethal Cry1Ac protoxin. *Archives of Insect Biochemistry and Physiology* 25.
- Liu YB, Luo ZL, Zhao YM and Xiao NW, The selective feeding of cotton bollworms (*Helicoverpa armigera*) on transgenic and non-transgenic cotton leaves from consecutive cultivation fields. *International Journal of Pest Management* 6.
- Liu LL, Chen ZW, Yang YC, Xiao YT, Liu CX, Ma YM, Soberon M, Bravo A, Yang YB and Liu KY, 2018. A single amino acid polymorphism in ABCC2 loop 1 is responsible for differential toxicity of *Bacillus thuringiensis* Cry1Ac toxin in

- different Check for Spodoptera (Noctuidae) species. *Insect Biochemistry and Molecular Biology* 100, 59-65.
- Liu MM, Huang R, Weisman A, Yu XY, Lee SH, Chen YL, Huang C, Hu SH, Chen XH, Tan WF, Liu F, Chen H and Shea KJ, 2018. Synthetic Polymer Affinity Ligand for *Bacillus thuringiensis* (Bt) CryI Ab/Ac Protein: The Use of Biomimicry Based on the Bt Protein-Insect Receptor Binding Mechanism. *Journal of the American Chemical Society* 140, 6853-6864.
- Liu MM, Zhang XJ, Gao Y, Shen ZC and Lin CY, 2018. Molecular characterization and efficacy evaluation of a transgenic corn event for insect resistance and glyphosate tolerance. *Journal of Zhejiang University-Science B* 19, 610-619.
- Liu T, Chen XY, Qi L, Chen FJ, Liu MQ and Whalen JK, 2018. Root and detritus of transgenic Bt crop did not change nematode abundance and community composition but enhanced trophic connections. *Science of the Total Environment* 644, 822-829.
- Liu A, Huang XF, Gong LJ, Guo ZJ, Zhang YJ and Yang ZX, 2019. Characterization of immune-related PGRP gene expression and phenoloxidase activity in CryIAC-susceptible and -resistant *Plutella xylostella* (L.). *Pesticide Biochemistry and Physiology* 160, 79-86.
- Liu J, NanGong ZY, Zhang J, Song P, Tang Y, Gao Y and Wang QY, 2019. Expression and characterization of two chitinases with synergistic effect and antifungal activity from *Xenorhabdus nematophila*. *World journal of microbiology & biotechnology* 35, 10.
- Liu YM, Li YH, Chen XP, Song XY, Shen P and Peng YF, 2019. No detrimental effect of Bt maize pollen containing CryIAb/2Aj or CryIAC on adult green lacewings *Chrysoperla sinica* Tjeder. *Journal of Integrative Agriculture* 18, 893-899.
- Lone SA, Malik A and Padaria JC, 2018. Molecular cloning and characterization of a novel vip3-type gene from *Bacillus thuringiensis* and evaluation of its toxicity against *Helicoverpa armigera*. *Microbial Pathogenesis* 114, 464-469.
- Lu X, Jiang DJ, Yan JX, Ma ZE, Luo XE, Wei TL, Xu Y and He QH, 2018. An ultrasensitive electrochemical immunosensor for CryIAb based on phage displayed peptides. *Talanta* 179, 646-651.
- Luong TTA, Zalucki MP, Perkins LE and Downes SJ, 2018. Feeding behaviour and survival of *Bacillus thuringiensis*-resistant and *Bacillus thuringiensis*- susceptible larvae of *Helicoverpa armigera* (Lepidoptera: Noctuidae) exposed to a diet with *Bacillus thuringiensis* toxin. *Austral Entomology* 57, 1-8.
- Luz PMC, Specht A, Paula-Moraes SV, Malaquias JV, Ferreira LFM, Otanasio PN and Diniz IR, 2019. Owllet moths (Lepidoptera: Noctuoidea) associated with Bt and non-Bt soybean in the brazilian savanna. *Brazilian Journal of Biology* 79, 248-256.
- Lv J, Zhang X, Gao TT, Cui TT, Peng Q, Zhang J and Song FP, 2019. Effect of the spoIIID mutation on mother cell lysis in *Bacillus thuringiensis*. *Applied Microbiology and Biotechnology* 103, 4103-4112.
- Ma YM, Zhang JF, Xiao YT, Yang YC, Liu CX, Peng R, Yang YB, Bravo A, Soberon M and Liu KY, 2019. The Cadherin CryIAC Binding-Region is Necessary for the Cooperative Effect with ABCC2 Transporter Enhancing Insecticidal Activity of *Bacillus thuringiensis* CryIAC Toxin. *Toxins* 11, 18.
- Majumder S, Sarkar C, Saha P, Gotyal BS, Satpathy S, Datta K and Datta SK, 2018. Bt Jute Expressing Fused delta-Endotoxin CryIAb/Ac for Resistance to Lepidopteran Pests. *Frontiers in Plant Science* 8, 14.
- Marques LH, Santos AC, Castro BA, Storer NP, Babcock JM, Lepping MD, Sa V, Moscardini VF, Rule DM and Fernandes OA, 2018. Impact of transgenic soybean

- p>expressing Cry1Ac and Cry1F proteins on the non-target arthropod community associated with soybean in Brazil.
- Plos One*
- 13, 23.
- Marques LH, Santos AC, Castro BA, Moscardini VF, Rosseto J, Silva O and Babcock JM, 2019. Assessing the Efficacy of *Bacillus thuringiensis* (Bt) Pyramided Proteins Cry1F, Cry1A.105, Cry2Ab2, and Vip3Aa20 Expressed in Bt Maize Against Lepidopteran Pests in Brazil. *Journal of Economic Entomology* 112, 803-811.
- Mathew LG, Ponnuraj J, Mallappa B, Chowdary LR, Zhang JW, Tay WT, Walsh TK, Gordon KHJ, Heckel DG, Downes S, Carriere Y, Li XC, Tabashnik BE and Fabrick JA, 2018. ABC transporter mis-splicing associated with resistance to Bt toxin Cry2Ab in laboratory- and field-selected pink bollworm. *Scientific Reports* 8, 15.
- McGale E, Diezel C, Schuman MC and Baldwin IT, 2018. Cry1Ac production is costly for native plants attacked by non-Cry1Ac-targeted herbivores in the field. *New Phytologist* 219, 714-727.
- Meissle M and Romeis J, 2018. Transfer of Cry1Ac and Cry2Ab proteins from genetically engineered Bt cotton to herbivores and predators. *Insect Science* 25, 823-832.
- Mendoza-Almanza G, Rocha-Zavaleta L, Aguilar-Zacarias C, Ayala-Lujan J and Olmos J, 2019. Cry1A Proteins are Cytotoxic to HeLa but not to SiHa Cervical Cancer Cells. *Current pharmaceutical biotechnology* 20, 1018-1027.
- Menon R, Sarao NK and Pathak M, 2018. In planta *Agrobacterium*-MEDIATED GENETIC TRANSFORMATION IN OKRA [*Abelmoschus esculentus* (L.) Moench]. *Applied Biological Research* 20, 221-227.
- Miao SZ, Yuan XZ, Liang YS, Wang H, Leng LJ, Wu ZB, Jiang LB, Li YF, Mo D and Zeng GM, 2018. In situ surface transfer process of Cry1Ac protein on SiO₂: The effect of biosurfactants for desorption. *Journal of hazardous materials* 341, 150-158.
- Mirzaei S, Dezhsetan S and Tohidfar M, 2018. Stacking of cry1Ab and Chitinase Genes in Commercial Cotton Varieties through Crossing. *Journal of Agricultural Science and Technology* 20, 1259-1268.
- Morshita M, 2019. High-dose/Refuge Strategy for Insect Resistance to Bt Crops. *Japanese Journal of Applied Entomology and Zoology* 63, 29-38.
- Moussa S, Baiomy F, Abouzaid K, Nasr M, Moussa EM and Kamel EA, 2018. Potential impact of host pest fed on Bt-modified corn on the development of *Chrysoperla carnea* (Stephens) (Neuroptera: Chrysopidae). *Egyptian Journal of Biological Pest Control* 28, 6.
- Muraro DS, Garlet CG, Godoy DN, Cossa GE, Rodrigues GLD, Stacke RF, Medeiros SLP, Guedes JVC and Bernardi O, 2019. Laboratory and field survival of *Spodoptera frugiperda* (Lepidoptera: Noctuidae) on Bt and non-Bt maize and its susceptibility to insecticides. *Pest Management Science* 75, 2202-2210.
- Murua MG, Vera MA, Herrero MI, Fogliata SV and Michel A, 2018. Defoliation of Soybean Expressing Cry1Ac by Lepidopteran Pests. *Insects* 9, 13.
- Mushtaq R, Shakoori AR and Jurat-Fuentes JL, 2018. Domain III of Cry1Ac Is Critical to Binding and Toxicity against Soybean Looper (*Chrysodeixis includens*) but Not to Velvetbean Caterpillar (*Anticarsia gemmatilis*). *Toxins* 10, 11.
- Naegeli H, Birch AN, Casacuberta J, De Schrijver A, Gralak MA, Guerche P, Jones H, Manachini B, Messean A, Nielsen EE, Nogue F, Robaglia C, Rostoks N, Sweet J, Tebbe C, Visioli F, Wal JM, Alvarez F, Ardizzone M, Paraskevopoulos K, Broll H, Devos Y, Dumont AF, Ruiz JAG, Lanzoni A, Neri FM, Olaru I, Papadopoulou N and O EPGM, 2018. Assessment of genetically modified maize 4114 for food and feed uses, under Regulation (EC) No 1829/2003 (application EFSA-GMO-NL-2014-123). *Efsa Journal* 16, 25.

- Naegeli H, Birch AN, Casacuberta J, De Schrijver A, Gralak MA, Guerche P, Jones H, Manachini B, Messean A, Nielsen EE, Nogue F, Robaglia C, Rostoks N, Sweet J, Tebbe C, Visioli F, Wal JM, Broll H, Gennaro A, Neri FM, Paraskevopoulos K and Modified EPG, 2018. Assessment of genetically modified cotton GHB614 x LLCotton25 x MON 15985 for food and feed uses, under Regulation (EC) No 1829/2003 (application EFSA-GMO-NL-2011-94). *Efsa Journal* 16, 27.
- Naik VCB, Kumbhare S, Kranthi S, Satija U and Kranthi KR, 2018. Field-evolved resistance of pink bollworm, *Pectinophora gossypiella* (Saunders) (Lepidoptera: Gelechiidae), to transgenic *Bacillus thuringiensis* (Bt) cotton expressing crystal 1Ac (Cry1Ac) and Cry2Ab in India. *Pest Management Science* 74, 2544-2554.
- Nava-Camberos U, Avila-Rodriguez V, Maltos-Buendias J, Garcia-Hernandez JL and Martinez-Carrillo JL, 2018. Populations and Damages of Insect Pests in Conventional and Bt Cotton in the Comarca Lagunera, Mexico. *Southwestern Entomologist* 43, 985-993.
- Navaei-Bonab R, Kazzazi M, Saber M and Vatanparast M, 2018. Differential Inhibition of *Helicoverpa armigera* (Lep.: Noctuidae) Gut Digestive Trypsin by Extracted and Purified Inhibitor of *Datura metel* (Solanales: Solanaceae). *Journal of Economic Entomology* 111, 178-186.
- Niu L, Tian ZY, Liu H, Zhou H, Ma WH, Lei CL and Chen LZ, 2018. Transgenic Bt cotton expressing Cry1Ac/Cry2Ab or Cry1Ac/EPSPS does not affect the plant bug *Adelphocoris suturalis* or the pollinating beetle *Haptoncus luteolus*. *Environmental Pollution* 234, 788-793.
- Niu Y, Head GP, Price PA and Huang FN, 2018. Inheritance and fitness costs of Cry1A.105 resistance in two strains of *Spodoptera frugiperda* (JE Smith). *Crop Protection* 110, 229-235.
- Olivi BM, Gore J, Musser FM, Catchot AL and Cook DR, 2019. Impact of Simulated Corn Earworm (Lepidoptera: Noctuidae) Kernel Feeding on Field Corn Yield. *Journal of Economic Entomology* 112, 2193-2198.
- Palinkas Z, Zalai M, Szenasi A, Dorner Z, Kiss J, North S, Woodward G and Balog A, 2018. Arthropods dataset from different genetically modified maize events and associated controls. *Scientific Data* 5, 6.
- Pan JG, Lv X, Jin DC, Bai ZH, Qi HY, Zhang HX and Zhuang GQ, 2019. Developmental stage has a greater effect than Cry1Ac expression in transgenic cotton on the phyllosphere mycobiome. *Canadian journal of microbiology* 65, 116-125.
- Pan Y, Dong Y, Wang RX and Yang MS, 2019. Generation of a promising universal RNAi vector system to control plant pests. *Acta Physiologiae Plantarum* 41, 12.
- Pande R, Shah V and Verma P, 2019. First report on identification of volatiles from egg and larval frass of Indian strain of the American bollworm *Helicoverpa armigera* (Hubner). *African Entomology* 27, 403-409.
- Pandey SP, Singh AP, Srivastava S, Chandrashekar K and Sane AP, 2019. A strong early acting wound-inducible promoter, RbPCD1pro, activates cryIac expression within minutes of wounding to impart efficient protection against insects. *Plant Biotechnology Journal* 17, 1458-1470.
- Panwar BS, Kaur J, Kumar P and Kaur S, 2018. A novel cry52Ca1 gene from an Indian *Bacillus thuringiensis* isolate is toxic to *Helicoverpa armigera* (cotton boll worm). *Journal of Invertebrate Pathology* 159, 137-140.
- Park D, Choi IY and Kim NS, 2019. Detection of mPing mobilization in transgenic rice plants. *Genes & genomics* 8.
- Peng C, Chen XY, Wang XF, Xu XL, Wei W, Wang CM and Xu JF, 2018. Comparative

- analysis of miRNA expression profiles in transgenic and non-transgenic rice using miRNA-Seq. Scientific Reports 8, 9.
- Peng Q, Yu QY and Song FP, 2019. **Expression of cry genes in *Bacillus thuringiensis* biotechnology**. Applied Microbiology and Biotechnology 103, 1617-1626.
- Perumalla S, Mercy D, Raghuvir S and Sam AM, 2018. Improved Cry1Ac expression levels during Bt cotton cultivation. Research Journal of Biotechnology 13, 20-25.
- Pinos D, Martinez-Solis M, Herrero S, Ferre J and Hernandez-Martinez P, 2019. The *Spodoptera exigua* ABCC2 Acts as a Cry1A Receptor Independently of its Nucleotide Binding Domain II. Toxins 11, 13.
- Prodhan MZH, Hasan MT, Chowdhury MMI, Alam MS, Rahman ML, Azad AK, Hossain MJ, Naranjo SE and Shelton AM, 2018. Bt eggplant (*Solanum melongena* L.) in Bangladesh: Fruit production and control of eggplant fruit and shoot borer (*Leucinodes orbonalis* Guenee), effects on non-target arthropods and economic returns. Plos One 13, 17.
- Prodhan MZH, Shirale DK, Islam MZ, Hossain MJ, Paranjape V and Shelton AM, 2019. Susceptibility of Field Populations of Eggplant Fruit and Shoot Borer (*Leucinodes orbonalis* Guenee) to Cry1Ac, the Protein Expressed in Bt Eggplant (*Solanum melongena* L.) in Bangladesh. Insects 10, 9.
- Qamar Z, Tariq M, Rehman T, Iqbal MS, Sarwar MB, Sharif MN, Hassan Z, Ahmad A, Zahra A, Latif A, Rashid B, Zaidi MA, Tabassum B, Hassan S, Baksh A, Javaid M, Akram S, Azam S, Naz F, Ahmed S, Bajwa KS, Awan MF, Shahid N, Ali A, Riaz S, Bashir B, Sadiq K, Kokab QU, Yousaf I, Farooq AM, Javed MA, Rahman ZU, Saleem MZ, Yasmin A, Bhatti MU, Arif U, Bashir K, Jamal A, Butt SJ, Arif A, Ahmad I, Rao AQ, Haider MS, Malik TH and Nasir IA, 2019. Trackable CEMB-Klean Cotton Transgenic Technology: Affordable Climate Neutral Agri-biotech Industrialization for Developing Countries. Advancements in Life Sciences 6, 131-138.
- Qian ZY, Zhang SJ, Zhang L, Zhang J, Liu YH, Zhou QH, Jiang SQ and Li SF, 2018. Subchronic toxicity study in rats evaluating genetically modified DAS-81419-2 soybean. Regulatory Toxicology and Pharmacology 96, 48-56.
- Qin D, Liu XY, Miceli C, Zhang Q and Wang PW, 2019. Soybean plants expressing the *Bacillus thuringiensis* cry8-like gene show resistance to *Holotrichia parallela*. BMC Biotechnology 19, 12.
- Qiu L, Wang P, Wu T, Li B, Wang X, Lei C, Lin Y, Zhao J and Ma W, 2018. Downregulation of *Chilo suppressalis* alkaline phosphatase genes associated with resistance to three transgenic *Bacillus thuringiensis* rice lines. Insect Molecular Biology 27, 83-89.
- Qiu L, Sun Y, Jiang Z, Yang P, Liu H, Zhou H, Wang X, Zhang W, Lin Y and Ma W, 2019. The midgut V-ATPase subunit A gene is associated with toxicity to crystal 2Aa and crystal 1Ca-expressing transgenic rice in *Chilo suppressalis*. Insect Molecular Biology 28, 520-527.
- Qiu XF, Lu XQ, Ren XM, Li R, Wu BB, Yang SS, Qi LL, Mo XT, Ding XZ, Xia LQ and Sun YJ, 2019. Solubility enhancement of Cry2Aa crystal through carboxy-terminal extension and synergism between the chimeric protein and Cry1Ac. Applied Microbiology and Biotechnology 103, 2243-2250.
- Rao WH, Zhan YT, Chen SL, Xu ZY, Huang TZ, Hong XX, Zheng YL, Pan XH and Guan X, 2018. Flowerlike Mg(OH)(2) Cross-Nanosheets for Controlling Cry1Ac Protein Loss: Evaluation of Insecticidal Activity and Biosecurity. Journal of Agricultural

- and Food Chemistry 66, 3651-3657.
- Raszick TJ, Suh CPC, Dickens CM and Sword GA, Genome-wide markers reveal temporal instability of local population genetic structure in the cotton fleahopper, *Pseudatomoscelis seriatus* (Hemiptera: Miridae). *Pest Management Science* 9.
- Reay-Jones FRF, 2019. Pest Status and Management of Corn Earworm (Lepidoptera: Noctuidae) in Field Corn in the United States. *Journal of Integrated Pest Management* 10, 9.
- Reinoso-Pozo Y, Del Rincon-Castro MC and Ibarra JE, 2018. Significant increase in toxicity of the Cry1Ac1 protein of *Bacillus thuringiensis* by the exchange of two amino acids in its domain III. *Biological Control* 125, 1-6.
- Reisig DD, Huseth AS, Bacheler JS, Aghaee MA, Braswell L, Burrack HJ, Flanders K, Greene JK, Herbert DA, Jacobson A, Paula-Moraes SV, Roberts P and Taylor SV, 2018. Long-Term Empirical and Observational Evidence of Practical *Helicoverpa zea* Resistance to Cotton With Pyramided Bt Toxins. *Journal of Economic Entomology* 111, 1824-1833.
- Reisig DD and Kurtz R, 2018. Bt Resistance Implications for *Helicoverpa zea* (Lepidoptera: Noctuidae) Insecticide Resistance Management in the United States. *Environmental Entomology* 47, 1357-1364.
- Rendon D, Taylor PW, Wilder SM and Whitehouse MEA, 2019. Does prey encounter and nutrient content affect prey selection in wolf spiders inhabiting Bt cotton fields? *Plos One* 14, 15.
- Reyaz AL, Balakrishnan N and Udayasuriyan V, 2018. A new observation on feeding behaviour of pink bollworm and its application in screening Bt-resistant population. *3 Biotech* 8, 6.
- Reyaz AL, Balakrishnan N and Udayasuriyan V, 2019. Genome sequencing of *Bacillus thuringiensis* isolate T414 toxic to pink bollworm (*Pectinophora gossypiella* Saunders) and its insecticidal genes. *Microbial Pathogenesis* 134, 6.
- Rocha-Munive MG, Soberon M, Castaneda S, Niaves E, Scheinvar E, Eguiarte LE, Mota-Sanchez D, Rosales-Robles E, Nava-Camberos U, Martinez-Carrillo JL, Blanco CA, Bravo A and Souza V, 2018. Evaluation of the Impact of Genetically Modified Cotton After 20 Years of Cultivation in Mexico. *Frontiers in Bioengineering and Biotechnology* 6, 12.
- Rodrigues-Silva N, Canuto AF, Oliveira DF, Teixeira AF, Santos-Amaya OF, Picanco MC and Pereira EJG, 2019. Negative cross-resistance between structurally different *Bacillus thuringiensis* toxins may favor resistance management of soybean looper in transgenic Bt cultivars. *Scientific Reports* 9, 9.
- Romeis J, Naranjo SE, Meissle M and Shelton AM, 2019. Genetically engineered crops help support conservation biological control. *Biological Control* 130, 136-154.
- Roy-Barman S, Raut RA, Sarkar A, Sabnam N, Chakraborty S and Saha P, 2018. RECENT ADVANCES IN THE DEVELOPMENT OF TRANSGENIC CROP PLANTS, BIOSAFETY ASPECTS, AND FUTURE PERSPECTIVES. Apple Acad Press Inc, Oakville, 271-411
- Rubio-Infante N, Ilhuicatz-Alvarado D, Torres-Martinez M, Reyes-Grajeda JP, Nava-Acosta R, Gonzalez-Gonzalez E and Moreno-Fierros L, 2018. The Macrophage Activation Induced by *Bacillus thuringiensis* Cry1Ac Protoxin Involves ERK1/2 and p38 Pathways and the Interaction with Cell-Surface-HSP70. *Journal of cellular biochemistry* 119, 580-598.
- Rupula K, Kosuri T, Gul MZ, Sharma B and Beedu SR, 2019. Immuno-analytical method development for detection of transgenic Cry1Ac protein and its validation. *Journal*

- of the Science of Food and Agriculture 99, 6903-6910.
- Sahin B, Gomis-Cebolla J, Gunes H and Ferre J, 2018. Characterization of *Bacillus thuringiensis* isolates by their insecticidal activity and their production of Cry and Vip3 proteins. *Plos One* 13, 18.
- Saini RP, Raman V, Dhandapani G, Malhotra EV, Sreevathsa R, Kumar PA, Sharma TR and Pattanayak D, 2018. Silencing of HaAce1 gene by host-delivered artificial microRNA disrupts growth and development of *Helicoverpa armigera*. *Plos One* 13, 16.
- Saleem MF, Shakoor A, Shahid M, Cheema MA, Shakeel A, Shahid M, Tahir MU and Bilal MF, 2018. Removal of early fruit branches as potential regulator of Cry1Ac, antioxidants, senescence and yield in Bt. cotton. *Industrial Crops and Products* 124, 885-898.
- Saleem MJ, Arshad M, Ahmed S and Sahi ST, 2019. VARIATION IN SUSCEPTIBILITY OF *Helicoverpa armigera* (LEPIDOPTERA: NOCTUIDAE) TO CRY1AC TOXIN. *Pakistan Journal of Agricultural Sciences* 56, 415-420.
- Salisu IB, Shahid AA, Yaqoob A, Rao AQ and Husnain T, 2019. Effect of dietary supplementation of recombinant Cry and Cp4 epsps proteins on haematological indices of growing rabbits. *Journal of animal physiology and animal nutrition* 103, 305-316.
- Santos-Vigil KI, Ilhuicatz-Alvarado D, Garcia-Hernandez AL, Herrera-Garcia JS and Moreno-Fierros L, 2018. Study of the allergenic potential of *Bacillus thuringiensis* Cry1Ac toxin following intra-gastric administration in a murine model of food-allergy. *International immunopharmacology* 61, 185-196.
- Schunemann R, Roggia S, Muraro DS, Knaak N and Fiuza LM, 2018. Insecticidal potential of *Bacillus thuringiensis* for the biological control of neotropical brown stink bug. *Entomologia Experimentalis Et Applicata* 166, 131-138.
- Seide VE, Bernardes RC, Pereira EJG and Lima MAP, 2018. Glyphosate is lethal and Cry toxins alter the development of the stingless bee *Melipona quadrifasciata*. *Environmental Pollution* 243, 1854-1860.
- Sellami S, Jemli S, Abdelmalek N, Cherif M, Abdelkefi-Mesrati L, Tounsi S and Jamoussi K, 2018. A novel Vip3Aa16-Cry1Ac chimera toxin: Enhancement of toxicity against *Ephestia kuehniella*, structural study and molecular docking. *International Journal of Biological Macromolecules* 117, 752-761.
- Shabbir MZ, Quan YD, Wang ZY, Bravo A, Soberon M and He KL, 2018. Characterization of the Cry1Ah resistance in Asian corn Borer and its cross-resistance to other *Bacillus thuringiensis* toxins. *Scientific Reports* 8, 9.
- Shahid AA, Salisu IB, Yaqoob A, Rao AQ, Ullah I and Husnain T, Assessing the fate of recombinant plant DNA in rabbit's tissues fed genetically modified cotton. *Journal of animal physiology and animal nutrition* 9.
- Shahid MR, Shakeel M, Farooq M, Arain MS, Hanif CMS, Yin HC, Akram M and Ahmad S, 2018. Earliness index deters *Pectinophora gossypiella* incidence on advanced cultivars of Bt cotton. *Arthropod-Plant Interactions* 12, 303-309.
- Shahid MI, Arshad M, ul Hasan M and Khan MA, 2019. Efficacy of Cry1Ac toxin from *Bacillus thuringiensis* against the beet armyworm, *Spodoptera exigua* (Hubner) (Lepidoptera: Noctuidae). *Egyptian Journal of Biological Pest Control* 29, 5.
- Shao ES, Chen C, Chen HZ, Liu SJ, Lin L, Wang YM, Guan X and Huang ZP, 2018. In vitro hydrolysis of *Bacillus thuringiensis* Cry1Ac toxin by gut proteases of *Nilaparvata lugens* (Stal) and binding assays of Cry1Ac toxin with brush border membrane of *N.lugens* midgut. *Biocontrol Science and Technology* 28, 446-458.

- Sharma HC and Dhillon MK, 2018. Bio-safety of *Helicoverpa*-resistant transgenic chickpea with *Bacillus thuringiensis* genes in the environment. *Indian Journal of Agricultural Sciences* 88, 820-827.
- Shelton AM, Hossain MJ, Paranjape V, Azad AK, Rahman ML, Khan A, Prodhan MZH, Rashid MA, Majumder R, Hossain MA, Hussain SS, Huesing JE and McCandless L, 2018. Bt Eggplant Project in Bangladesh: History, Present Status, and Future Direction. *Frontiers in Bioengineering and Biotechnology* 6, 6.
- Shelton AM, Hossain MJ, Paranjape V, Prodhan MZH, Azad AK, Majumder R, Sarwer SH and Hossain MA, 2019. Bt Brinjal in Bangladesh: The First Genetically Engineered Food Crop in a Developing Country. *Cold Spring Harbor perspectives in biology* 11, 13.
- Shera PS, Karmakar P, Sharma S and Sangha KS, 2018. Impact of Bt cotton expressing single (Cry1Ac) and dual toxins (Cry1Ac and Cry2Ab) on the fitness of the predator *Chrysoperla zastrowi sillemi* (Esben-Petersen): prey-mediated tri-trophic analysis. *Egyptian Journal of Biological Pest Control* 28, 7.
- Siddiqui HA, Asif M, Asad S, Naqvi RZ, Ajaz S, Umer N, Anjum N, Rouf I, Sarwar M, Arshad M, Amin I, Saeed M, Mukhtar Z, Bashir A and Mansoor S, 2019. Development and evaluation of double gene transgenic cotton lines expressing Cry toxins for protection against chewing insect pests. *Scientific Reports* 9, 7.
- Signorini AM, Abratti G, Grimi D, Machado M, Bunge FF, Parody B, Ramos L, Cortese P, Vesprini F, Whelan A, Araujo MP, Podworny M, Cadile A and Malacarne MF, 2018. Management of Field-Evolved Resistance to Bt Maize in Argentina: A Multi-Institutional Approach. *Frontiers in Bioengineering and Biotechnology* 6, 5.
- Silva LM, Silva MC, Silva S, Alves RC, Siqueira HAA and Marques EJ, 2018. Toxin Gene Contents and Activity of *Bacillus thuringiensis* Strains Against Two Sugarcane Borer Species, *Diatraea saccharalis* (F.) and *D-flavipennella* (Box). *Neotropical Entomology* 47, 292-301.
- Silva LB, Maggioni K, Ferreira RH, Silva AF, Pavan BE and Lopes GN, 2019. Survival and nutritional indexes of *Spodoptera frugiperda* (J.E. Smith, 1797) (Lepidoptera: Noctuidae) maintained in Bt maize for five generations. *Revista Brasileira De Ciencias Agrarias-Agraria* 14, 8.
- Singh S, Kumar NR, Maniraj R, Lakshmikanth R, Rao KYS, Muralimohan N, Arulprakash T, Karthik K, Shashibhushan NB, Vinutha T, Pattanayak D, Dash PK, Kumar PA and Sreevathsa R, 2018. Expression of Cry2Aa, a *Bacillus thuringiensis* insecticidal protein in transgenic pigeon pea confers resistance to gram pod borer, *Helicoverpa armigera*. *Scientific Reports* 8, 12.
- Sivamani E, Nalapalli S, Prairie A, Bradley D, Richbourg L, Strebe T, Liebler T, Wang DL and Que QD, 2019. A study on optimization of pat gene expression cassette for maize transformation. *Molecular Biology Reports* 46, 3009-3017.
- Smith JL, Baute TS, Sebright MM, Schaafsma AW and DiFonzo CD, 2018. Establishment of *Striacosta albicosta* (Lepidoptera: Noctuidae) as a Primary Pest of Corn in the Great Lakes Region. *Journal of Economic Entomology* 111, 1732-1744.
- Smith JL, Limay-Rios V, Hooker DC and Schaafsma AW, 2018. *Fusarium graminearum* Mycotoxins in Maize Associated With *Striacosta albicosta* (Lepidoptera: Noctuidae) Injury. *Journal of Economic Entomology* 111, 1227-1242.
- Song YY, Liu RY, Wang MF, Liu MQ, Liu XH, Ge F and Chen FJ, Effects of transgenic Bt rice lines with single Cry1Ab and fused Cry1Ab/Cry1Ac on the abundance dynamics and community diversity of soil mites. *Archives of Agronomy and Soil Science* 14.

- Song XY, Chang L, Reddy GVP, Zhang L, Fan CM and Wang BF, 2019. Use of Taxonomic and Trait-Based Approaches to Evaluate the Effects of Transgenic Cry1Ac Corn on the Community Characteristics of Soil Collembola. *Environmental Entomology* 48, 263-269.
- Souza CSF, Silveira LCP, Paula DP, Andow DA and Mendes SM, 2018. Transfer of Cry1F from Bt maize to eggs of resistant *Spodoptera frugiperda*. *Plos One* 13, 10.
- Souza CSF, Silveira LCP, Pitta RM, Waquil JM, Pereira EJJ and Mendes SM, 2019. Response of field populations and Cry-resistant strains of fall armyworm to Bt maize hybrids and Bt-based bioinsecticides. *Crop Protection* 120, 1-6.
- Srikanth P, Mercy D, Ann M and Sam AM, 2019. Optimization of spacing and refuge strategy for improved Cry1Ac expression level in Bt cotton. *Research Journal of Biotechnology* 14, 45-52.
- Suassuna ND, Morello CD, Pedrosa MB, Barroso PAV, da Silva JL, Suassuna TDF, Perina FJ, Sofiatti V, Magalhaes FOD and Farias FJC, 2018. BRS 430 B2RF and BRS 432 B2RF: Insect-resistant and glyphosate-tolerant high-yielding cotton cultivars. *Crop Breeding and Applied Biotechnology* 18, 221-225.
- Takabatake R, Kagiya Y, Minegishi Y, Futo S, Soga K, Nakamura K, Kondo K, Mano J and Kitta K, 2018. Rapid Screening Detection of Genetically Modified Crops by Loop-Mediated Isothermal Amplification with a Lateral Flow Dipstick. *Journal of Agricultural and Food Chemistry* 66, 7839-7845.
- Takabatake R, Kagiya Y, Minegishi Y, Yeasmin S, Futo S, Noguchi A, Kondo K, Mano J and Kitta K, 2018. Development and evaluation of rapid screening detection methods for genetically modified crops using loop-mediated isothermal amplification. *Food Chemistry* 252, 390-396.
- Takahashi TA, Nishimura G, Carneiro E and Foerster LA, 2019. First record of *Peridroma saucia* Hubner (Lepidoptera: Noctuidae) in transgenic soybeans. *Revista Brasileira De Entomologia* 63, 199-201.
- Tang H, Chen G, Chen FJ, Han LZ and Peng YF, 2018. Development and relative fitness of Cry1C resistance in *Chilo suppressalis*. *Pest Management Science* 74, 590-597.
- Tang QF, Yang ZP, Han RR, Zhang Y, Shen C and Wang J, 2019. No Effect of Bt-transgenic Rice on the Tritrophic Interaction of the Stored Rice, the Maize Weevil *Sitophilus Zeamais* and the Parasitoid Wasp *Theocolax elegans*. *Scientific Reports* 9, 7.
- Tessnow AE, Behmer ST, Walsh TK and Sword GA, 2018. Protein-carbohydrate regulation in *Helicoverpa amigera* and *H. punctigera* and how diet protein-carbohydrate content affects insect susceptibility to Bt toxins. *Journal of insect physiology* 106, 88-95.
- Tian JC, Wang XP, Chen Y, Romeis J, Naranjo SE, Hellmich RL, Wang P and Shelton AM, 2018. Bt cotton producing Cry1Ac and Cry2Ab does not harm two parasitoids, *Cotesia marginiventris* and *Copidosoma floridanum*. *Scientific Reports* 8, 6.
- Vanti GL, Katageri IS, Inamdar SR, Hiremathada V and Swamy BM, 2018. Potent insect gut binding lectin from *Sclerotium rolfsii* impart resistance to sucking and chewing type insects in cotton. *Journal of biotechnology* 278, 20-27.
- Vassallo CN, Bunge FF, Signorini AM, Valverde-Garcia P, Rule D and Babcock J, 2019. Monitoring the Evolution of Resistance in *Spodoptera frugiperda* (Lepidoptera: Noctuidae) to the Cry1F Protein in Argentina. *Journal of Economic Entomology* 112, 1838-1844.
- Viktorov AG, 2019. Genetic Engineering-Based Modern Approaches to Enhance Crop Resistance to Pests. *Russian Journal of Plant Physiology* 66, 1-9.

- Walsh T, James B, Chakroun M, Ferre J and Downes S, 2018. Isolating, characterising and identifying a Cry1Ac resistance mutation in field populations of *Helicoverpa punctigera*. *Scientific Reports* 8, 9.
- Walters FS, Graser G, Burns A and Raybould A, 2018. When the Whole is Not Greater than the Sum of the Parts: A Critical Review of Laboratory Bioassay Effects Testing for Insecticidal Protein Interactions. *Environmental Entomology* 47, 484-497.
- Wang JT, Xu D, Wang L, Cong SB, Wan P, Lei CL, Fabrick JA, Li XC, Tabashnik BE and Wu KM, Bt resistance alleles in field populations of pink bollworm from China: Similarities with the United States and decreased frequency from 2012 to 2015. *Pest Management Science* 7.
- Wang CX, Li WZ, Kessenich CR, Petrick JS, Rydel TJ, Sturman EJ, Lee TC, Glenn KC and Edrington TC, 2018. Safety of the *Bacillus thuringiensis*-derived Cry1A.105 protein: Evidence that domain exchange preserves mode of action and safety. *Regulatory Toxicology and Pharmacology* 99, 50-60.
- Wang DM, Yang XM, Li HQ, Wuwaishi A, Ding RF, Li HB, Pan HS, Liu J, Xu Y and Lu YH, 2018. Genetic homogeneity between populations of cotton bollworm from Xinjiang, China. *Journal of Asia-Pacific Entomology* 21, 309-315.
- Wang GY, Dong Y, Liu XJ, Yao GS, Yu XY and Yang MS, 2018. The Current Status and Development of Insect-Resistant Genetically Engineered Poplar in China. *Frontiers in Plant Science* 9, 15.
- Wang GY and Fok M, 2018. Managing pests after 15 years of Bt cotton: Farmers' practices, performance and opinions in northern China. *Crop Protection* 110, 251-260.
- Wang JX, Lin GF, Batool K, Zhang SQ, Chen MF, Xu J, Wu J, Jin L, Gelbic I, Xu L, Zhang LL and Guan X, 2018. Alimentary Tract Transcriptome Analysis of the Tea Geometrid, *Ectropis oblique* (Lepidoptera: Geometridae). *Journal of Economic Entomology* 111, 1411-1419.
- Wang L, Ma YM, Wan P, Liu KY, Xiao YT, Wang JT, Cong SB, Xu D, Wu KM, Fabrick JA, Li XC and Tabashnik BE, 2018. Resistance to *Bacillus thuringiensis* linked with a cadherin transmembrane mutation affecting cellular trafficking in pink bollworm from China. *Insect Biochemistry and Molecular Biology* 94, 28-35.
- Wang XY, Liu QS, Meissle M, Peng YF, Wu KM, Romeis J and Li YH, 2018. Bt rice could provide ecological resistance against nontarget planthoppers. *Plant Biotechnology Journal* 16, 1748-1755.
- Wang Y, Li DB, Zhou H, Liu H, Niu L, Wang LH and Ma WH, 2018. Evaluation of Cry1Ac and Cry2Aa Toxin Binding to Two Important Beneficial Cotton Field Insects, *Harmonia axyridis* and *Orius similis*. *Journal of Agricultural and Food Chemistry* 66, 8698-8702.
- Wang YH, Gao J, Sun MF, Chen JP, Zhang X, Chen Y and Chen DH, 2018. Impacts of soil salinity on Bt protein concentration in square of transgenic Bt cotton. *Plos One* 13, 13.
- Wang BJ, Wang YN, Wei JZ, Liu C, Chen L, Khaing MM and Liang GM, 2019. Polycalin is involved in the action mechanism of Cry2Aa toxin in *Helicoverpa armigera* (Hubner). *Journal of Integrative Agriculture* 18, 627-635.
- Wang JD, Zhang JS, Guo YF, Chen LF, Wang FL, Huang MT, Gao SJ and Wang R, 2019. Molecular cloning, characterization, and expression profiling analysis of Cry toxin receptor genes from sugarcane shoot borer *Chilo infuscatellus* (Snellen). *Pesticide Biochemistry and Physiology* 157, 186-195.
- Wang L, Ma YM, Guo XQ, Wan P, Liu KY, Cong SB, Wang JT, Xu D, Xiao YT, Li XC, Tabashnik BE and Wu KM, 2019. Pink Bollworm Resistance to Bt Toxin Cry1Ac

- Associated with an Insertion in Cadherin Exon 20. *Toxins* 11, 13.
- Wang L, Wang JT, Ma YM, Wan P, Liu KY, Cong SB, Xiao YT, Xu D, Wu KM, Fabrick JA, Li XC and Tabashnik BE, 2019. Transposon insertion causes cadherin mis-splicing and confers resistance to Bt cotton in pink bollworm from China. *Scientific Reports* 9, 10.
- Wang PP, Ma JH, Head GP, Xia DP, Li J, Wang HQ, Yang ML, Xie ZM, Zalucki MP and Lu ZZ, 2019. Susceptibility of *Helicoverpa armigera* to two Bt toxins, Cry1Ac and Cry2Ab, in northwestern China: toward developing an IRM strategy. *Journal of Pest Science* 92, 923-931.
- Wang Y, Zhang X, Xie YJ, Wu AH, Zai XM and Liu XJ, 2019. High-affinity phage-displayed peptide as a recognition probe for the detection of Cry2Ad2-3. *International Journal of Biological Macromolecules* 137, 562-567.
- Wang YF, Wang JL, Fu XR, Nageotte JR, Silverman J, Bretsnyder EC, Chen DQ, Rydel TJ, Bean GJ, Li KS, Kraft E, Gowda A, Nance A, Moore RG, Pleau MJ, Milligan JS, Anderson HM, Asiimwe P, Evans A, Moar WJ, Martinelli S, Head GP, Haas JA, Baum JA, Yang F, Kerns DL and Jerga A, 2019. *Bacillus thuringiensis* Cry1Da₇ and Cry1B.868 Protein Interactions with Novel Receptors Allow Control of Resistant Fall Armyworms, *Spodoptera frugiperda* (JE Smith). *Applied and Environmental Microbiology* 85, 15.
- Wang YQ, Quan YD, Yang J, Shu CL, Wang ZY, Zhang J, Gatehouse AMR, Tabashnik BE and He KL, 2019. Evolution of Asian Corn Borer Resistance to Bt Toxins Used Singly or in Pairs. *Toxins* 11, 9.
- Wei JZ, Liang GM, Wu KM, Gu SH, Guo YY, Ni XZ and Li XC, 2018. Cytotoxicity and binding profiles of activated Cry1Ac and Cry2Ab to three insect cell lines. *Insect Science* 25, 655-666.
- Wei JZ, Yang S, Chen L, Liu XG, Du MF, An SH and Liang GM, 2018. Transcriptomic Responses to Different Cry1Ac Selection Stresses in *Helicoverpa armigera*. *Frontiers in Physiology* 9, 17.
- Wei JZ, Zhang LL, Yang S, Xie BT, An SH and Liang GM, 2018. Assessment of the lethal and sublethal effects by spinetoram on cotton bollworm. *Plos One* 13, 11.
- Wei J, Zhang M, Liang G and Li X, 2019. Alkaline phosphatase 2 is a functional receptor of Cry1Ac but not Cry2Ab in *Helicoverpa zea*. *Insect Molecular Biology* 28, 372-379.
- Wei JZ, Zhang YL and An SH, 2019. The progress in insect cross-resistance among *Bacillus thuringiensis* toxins. *Archives of Insect Biochemistry and Physiology* 102, 15.
- Wu AJ, Chapman K, Sathischandra S, Massengill J, Araujo R, Soria M, Bugas M, Bishop Z, Haas C, Holliday B, Cisneros K, Lor J, Canez C, New S, Mackie S, Ghoshal D, Privalle L, Hunst P and Pallett K, 2019. GHB614 x T304-40 x GHB119 x COT102 Cotton: Protein Expression Analyses of Field-Grown Samples. *Journal of Agricultural and Food Chemistry* 67, 275-281.
- Xiao YT and Wu KM, 2019. Recent progress on the interaction between insects and *Bacillus thuringiensis* crops. *Philosophical Transactions of the Royal Society B-Biological Sciences* 374, 15.
- Xie XW, Cui ZF, Wang YA, Wang YY, Cao FQ, Romeis J, Peng YF and Li YH, 2019. *Bacillus thuringiensis* Maize Expressing a Fusion Gene Cry1Ab/Cry1AcZM Does Not Harm Valued Pollen Feeders. *Toxins* 11, 13.
- Xing YJ, Qin ZF, Feng MY, Li AM, Zhang L, Wang Y, Dong XH, Zhang YX, Tan SQ and Shi WP, 2019. The impact of Bt maize expressing the Cry1Ac protein on non-target arthropods. *Environmental Science and Pollution Research* 26, 5814-5819.

- Xu C, Cheng JH, Lin HY, Lin CY, Gao JH and Shen ZC, 2018. Characterization of transgenic rice expressing fusion protein Cry1Ab/Vip3A for insect resistance. *Scientific Reports* 8, 8.
- Yang F, Chen M, Gowda A, Kerns DL and Huang FN, 2018. Possibly similar genetic basis of resistance to *Bacillus thuringiensis* Cry1Ab protein in 3 resistant colonies of the sugarcane borer collected from Louisiana, USA. *Insect Science* 25, 241-250.
- Yang F, Morsello S, Head GP, Sansone C, Huang FN, Gilreath RT and Kerns DL, 2018. F-2 screen, inheritance and cross-resistance of field-derived Vip3A resistance in *Spodoptera frugiperda* (Lepidoptera: Noctuidae) collected from Louisiana, USA. *Pest Management Science* 74, 1769-1778.
- Yang J, Quan YD, Sivaprasath P, Shabbir MZ, Wang ZY, Ferre J and He KL, 2018. Insecticidal Activity and Synergistic Combinations of Ten Different Bt Toxins against *Mythimna separata* (Walker). *Toxins* 10, 10.
- Yang F, Gonzalez JCS, Williams J, Cook DC, Gilreath RT and Kerns DL, 2019. Occurrence and Ear Damage of *Helicoverpa zea* on Transgenic *Bacillus thuringiensis* Maize in the Field in Texas, US and Its Susceptibility to Vip3A Protein. *Toxins* 11, 13.
- Yang XW, Chen WB, Song XZ, Ma XL, Cotto-Rivera RO, Kain W, Chu HN, Chen YR, Fei ZJ and Wang P, 2019. Mutation of ABC transporter ABCA2 confers resistance to Bt toxin Cry2Ab in *Trichoplusia ni*. *Insect Biochemistry and Molecular Biology* 112, 11.
- Yaqoob A, Shahid AA, Salisu IB, Azam S, Ahmed M and Rao AQ, 2019. Effects of Cry toxins on non-target soil bacteria during a 2-year follow up study. *Spanish Journal of Agricultural Research* 17, 8.
- Yu T, Li X, Coates BS, Zhang Q, Siegfried BD and Zhou X, 2018. microRNA profiling between *Bacillus thuringiensis* Cry1Ab-susceptible and -resistant European corn borer, *Ostrinia nubilalis* (Hubner). *Insect Molecular Biology* 27, 279-294.
- Zanga D, Sanahuja G, Eizaguirre M, Albajes R, Christou P, Capell T, Fraser P, Gerrisch C and Lopez C, 2018. Carotenoids moderate the effectiveness of a Bt gene against the European corn borer, *Ostrinia nubilalis*. *Plos One* 13, 16.
- Zhang W, Lu YH, van der Werf W, Huang JK, Wu F, Zhou K, Deng XZ, Jiang YY, Wu KM and Rosegrant MW, 2018. Multidecadal, county-level analysis of the effects of land use, Bt cotton, and weather on cotton pests in China. *Proceedings of the National Academy of Sciences of the United States of America* 115, E7700-E7709.
- Zhang X, Gao TT, Peng Q, Song L, Zhang J, Chai YR, Sun DM and Song FP, 2018. A strong promoter of a non-cry gene directs expression of the cry1Ac gene in *Bacillus thuringiensis*. *Applied Microbiology and Biotechnology* 102, 3687-3699.
- Zhang X, Rui QZ, Liang PP, Wei CH, Deng GQ, Chen Y, Chen Y, Dong ZD and Chen DH, 2018. Dynamics of Bt cotton Cry1Ac protein content under an alternating high temperature regime and effects on nitrogen metabolism. *Journal of Integrative Agriculture* 17, 1991-1998.
- Zhang DD, Xiao YT, Chen WB, Lu YH and Wu KM, 2019. Field monitoring of *Helicoverpa armigera* (Lepidoptera: Noctuidae) Cry1Ac insecticidal protein resistance in China (2005-2017). *Pest Management Science* 75, 753-759.
- Zhang M, Wei JZ, Ni XZ, Zhang J, Jurat-Fuentes JL, Fabrick JA, Carriere Y, Tabashnik BE and Li XC, 2019. Decreased Cry1Ac activation by midgut proteases associated with Cry1Ac resistance in *Helicoverpa zea*. *Pest Management Science* 75, 1099-1106.
- Zhang MJ, Feng MC, Xiao LJ, Song XY, Guangwei D and Yang WD, 2019. Persistence of Cry1Ac Protein from Transgenic Bt Cotton Cultivation and Residue Returning in

- Fields and Its Effect on Functional Diversity of Soil Microbial Communities. *Pedosphere* 29, 114-122.
- Zhao M, Li YH, Yuan XD, Liang GM, Wang BJ, Liu C and Khaing MM, 2018. Establishment of a dietary exposure assay for evaluating the toxicity of insecticidal compounds to *Apolygus lucorum* (Hemiptera: Miridae). *Environmental Pollution* 237, 414-423.
- Zhong JF, Hu XD, Zhang X, Liu Y, Xu CX, Zhang CZ, Lin MM and Liu XJ, 2018. Broad specificity immunoassay for detection of *Bacillus thuringiensis* Cry toxins through engineering of a single chain variable fragment with mutagenesis and screening. *International Journal of Biological Macromolecules* 107, 920-928.
- Zhou JL, Guo ZJ, Kang S, Qin JY, Gong LJ, Sun D, Guo L, Zhu LH, Bai Y, Zhang ZZ, Zhou XM and Zhang YJ, Reduced expression of the P-glycoprotein gene *PxABCB1* is linked to resistance to *Bacillus thuringiensis* Cry1Ac toxin in *Plutella xylostella* (L.). *Pest Management Science* 9.
- Zhou LQ, Alphey N, Walker AS, Travers LM, Hasan F, Morrison NI, Bonsall MB and Raymond B, 2018. Combining the high-dose/refuge strategy and self-limiting transgenic insects in resistance management-A test in experimental mesocosms. *Evolutionary Applications* 11, 727-738.
- Zhou YW, Niu Y, Head GP, Price PA and Huang FN, 2018. Performance of Bt-susceptible and -heterozygous genotypes of *Spodoptera frugiperda* (JE Smith) possessing single- or dual-gene resistance alleles in sequential feedings of non-Bt and Cry1A.105/Cry2Ab2 maize leaf tissues. *Journal of Invertebrate Pathology* 159, 105-112.
- Zhou LQ, Alphey N, Walker AS, Travers LM, Morrison NI, Bonsall MB and Raymond B, 2019. The application of self-limiting transgenic insects in managing resistance in experimental metapopulations. *Journal of Applied Ecology* 56, 688-698.
- Zhou MY, Li YB, Cui Q, Abidallha E, Chen Y and Chen DH, 2019. Square Insecticidal Protein Concentration Relate to its Biomass in Bt Cotton. *Agronomy Journal* 111, 467-472.
- Zhu CQ, Niu Y, Zhou YW, Guo JG, Head GP, Price PA, Wen XJ and Huang FN, 2019. Survival and effective dominance level of a Cry1A.105/Cry2Ab2-dual gene resistant population of *Spodoptera frugiperda* (JE Smith) on common pyramided Bt corn traits. *Crop Protection* 115, 84-91.
- Zia MA, Shinwari ZK, Ali S, Shah SH, Anwar M and Ali GM, 2018. COMPARISON AMONG DIFFERENT COTTON (*GOSSYPIUM HIRSUTUM* L.) GENOTYPES WITH RESPECT TO MORPHOLOGICAL, FIBRE QUALITY ATTRIBUTES AND EXPRESSION ANALYSIS OF CRY1AC GENE. *Journal of Animal and Plant Sciences* 28, 819-829.
- Zubair M, Latif A, Rao AQ, Azam S, Shahid N, Samiullah TR, Yasmeen A, Shahid AA, Nasir IA and Husnain T, 2019. A Combinational Approach of Enhanced Methanol Production and Double Bt Genes for Broad Spectrum Insect Resistance in Transgenic Cotton. *Molecular biotechnology* 61, 663-673.

2. Entries retrieved using CABI

- Abbas MST, 2018. Genetically engineered (modified) crops (*Bacillus thuringiensis* crops) and the world controversy on their safety. *Egyptian Journal of Biological Pest Control* 28, (19 June 2018).
- Abdelgaffar HM, Oppert C, Sun X, Monserrate J and Jurat-Fuentes JL, 2019. Differential heliothine susceptibility to Cry1Ac associated with gut proteolytic activity.

- Pesticide Biochemistry and Physiology 153, 1-8.
- Abudulai M, Chamba EB, Nboyine JA, Adombilla R, Yahaya I, Seidu A and Kangben F, 2018. Field efficacy of genetically modified FK 95 Bollgard II cotton for control of bollworms, Lepidoptera, in Ghana. *Agriculture and Food Security* 7, (3 November 2018).
- Ai X, Wei Y, Huang L, Zhao J, Wang Y and Liu X, 2018. Developmental control of *Helicoverpa armigera* by ingestion of bacteria expressing dsRNA targeting an arginine kinase gene. *Biocontrol Science and Technology* 28, 253-267.
- Anjum R, Baloch MJ, Baloch GM and Chachar Q, 2019. Significance of cross combinations for developing Bt cotton varieties for optimum gene (Cry1Ac) expression level required for better bollworm control. *JAPS, Journal of Animal and Plant Sciences* 29, 531-538.
- Archibald WR, Bradshaw JD, Golick DA, Wright RJ and Peterson JA, 2018. Nebraska growers' and crop consultants' knowledge and implementation of integrated pest management of western bean cutworm. *Journal of Integrated Pest Management* 9, 1.
- Bahar MH, Stanley J, Backhouse D, Mensah R, Socorro Ad and Gregg P, 2019. Survival of *Helicoverpa armigera* larvae on and Bt toxin expression in various parts of transgenic Bt cotton (Bollgard II) plants. *Entomologia Experimentalis Et Applicata* 167, 415-423.
- Bakhsh A, Dinc T, Hussain T, Demirel U, Aasim M and Caliskan ME, 2018. Development of transgenic tobacco lines with pyramided insect resistant genes. *Turkish Journal of Biology* 42, 174-186.
- Bengyella L, Yekwa EL, Sehrish I, Kiran N, Jose RC, Fonmboh DJ, Tambo E and Pranab R, 2018. Global challenges faced by engineered *Bacillus thuringiensis* cry genes in soybean (*Glycine max* L.) in the twenty-first century. *3 Biotech* 8, 464.
- Bilbo TR, Reay-Jones FPF, Reisig DD, Musser FR and Greene JK, 2018. Effects of Bt corn on the development and fecundity of corn earworm (Lepidoptera: Noctuidae). *Journal of Economic Entomology* 111, 2233-2241.
- Bilbo TR, Reay-Jones FPF, Reisig DD and Greene JK, 2019. Susceptibility of corn earworm (Lepidoptera: Noctuidae) to Cry1A.105 and Cry2Ab2 in North and South Carolina. *Journal of Economic Entomology* 112, 1845-1857.
- Bilbo TR, Reay-Jones FPF, Reisig DD, Greene JK and Turnbull MW, 2019. Development, survival, and feeding behavior of *Helicoverpa zea* (Lepidoptera: Noctuidae) relative to Bt protein concentrations in corn ear tissues. *Plos One* 14, e0221343.
- Bird LJ, 2018. Pyrethroid and carbamate resistance in Australian *Helicoverpa armigera* (Lepidoptera: Noctuidae) from 2008 to 2015: what has changed since the introduction of Bt cotton? *Bulletin of Entomological Research* 108, 781-791.
- Botha AS, Erasmus A, Plessis Hd and Berg Jvd, 2019. Efficacy of Bt maize for control of *Spodoptera frugiperda* (Lepidoptera: Noctuidae) in South Africa. *Journal of Economic Entomology* 112, 1260-1266.
- Bowman HD, Barber T, Norsworthy JK and Coffman WD, 2018. Addition of fluridone in Bollgard II XtendFlex cotton herbicide programs. *Research Series - Arkansas Agricultural Experiment Station* 77-80.
- Braswell LR, Reisig DD, Sorenson CE and Collins GD, 2019. *Helicoverpa zea* (Lepidoptera: Noctuidae) oviposition and larval vertical distribution in Bt cotton under different levels of nitrogen and irrigation. *Journal of Economic Entomology* 112, 1237-1250.
- Braswell LR, Reisig DD, Sorenson CE and Collins GD, 2019. *Helicoverpa zea*

- (Lepidoptera: Noctuidae) preference for plant structures, and their location, within Bt cotton under different nitrogen and irrigation regimes. *Journal of Economic Entomology* 112, 1741-1751.
- Braswell LR, Reisig DD, Sorenson CE and Collins GD, 2019. Development and dispersal of *Helicoverpa zea* (Lepidoptera: Noctuidae) on non-Bt and Bt pyramided cotton. *Environmental Entomology* 48, 465-477.
- Carriere Y, Degain BA, Unnithan GC, Harpold VS, Heuberger S, Li X and Tabashnik BE, 2018. Effects of seasonal changes in cotton plants on the evolution of resistance to pyramided cotton producing the Bt toxins Cry1Ac and Cry1F in *Helicoverpa zea*. *Pest Management Science* 74, 627-637.
- Carriere Y, Williams JL, Crowder DW and Tabashnik BE, 2018. Genotype-specific fitness cost of resistance to Bt toxin Cry1Ac in pink bollworm. *Pest Management Science* 74, 2496-2503.
- Carriere Y, Yelich AJ, Degain BA, Harpold VS, Unnithan GC, Kim JH, Mathew LG, Head GP, Rathore KS, Fabrick JA and Tabashnik BE, 2019. Gossypol in cottonseed increases the fitness cost of resistance to Bt cotton in pink bollworm. *Crop Protection* 126, 104914.
- Chandrasena DI, Signorini AM, Abratti G, Storer NP, Olaciregui ML, Alves AP and Pilcher CD, 2018. Characterization of field-evolved resistance to *Bacillus thuringiensis*-derived Cry1F delta-endotoxin in *Spodoptera frugiperda* populations from Argentina. *Pest Management Science* 74, 746-754.
- Chang M, Zhao D, Zhang Y, Xu C, Lu X and Guo W, 2019. In vitro binding characteristics of three kinds of Bt proteins in the midgut alkaline phosphatase HcALP1 of *Bacillus thuringiensis*. *Acta Sericologica Sinica* 331-337.
- Chaudhari K, Desai HR and Patel NM, 2018. Determination of economic threshold level of cotton leafhopper (*Amarasca biguttula biguttula* Ishida) on cotton under south Gujarat condition. *Trends in Biosciences* 11, 52-57.
- Chen W, Liu C, Lu G, Cheng H, Shen Z and Wu K, 2018. Effects of Vip3AcAa+Cry1Ac cotton on midgut tissue in *Helicoverpa armigera* (Lepidoptera: Noctuidae). *Journal of Insect Science* 18, 13.
- Chen X, Gao T, Peng Q, Zhang J, Chai Y and Song F, 2018. Novel cell wall hydrolase CwlC from *Bacillus thuringiensis* is essential for mother cell lysis. *Applied and Environmental Microbiology* 84, e02640-02617.
- Chen Y, Li Y, Zhou M, Cai Z, Tambel LIM, Zhang X, Chen Y and Chen D, 2019. Nitrogen deficit decreases seed Cry1Ac endotoxin expression in Bt transgenic cotton. *Plant Physiology and Biochemistry* 141, 114-121.
- Chu B, Zhang S, Luo J, Wang C, Lv L, Zhu X, Wang L and Cui J, 2018. The expression and function of Ghppol gene in cotton (*Gossypium hirsutum*) defense. *Journal of Agricultural Biotechnology* 26, 34-42.
- Coffman W, Barber LT, Norsworthy JK, Hill ZT and Bowman HD, 2018. Evaluation of salvage treatment options in XtendFlex cotton. *Research Series - Arkansas Agricultural Experiment Station* 73-76.
- Dattatray S, Mangesh P, Bharat C and Srinivas P, 2018. Selection and inheritance of Cry1Ac resistance in eggplant fruit and shoot borer (*Leucinodes orbonalis*). *International Journal of Tropical Agriculture* 36, 159-165.
- Dayakar B, Srinath T, Gundra SR, Vudem DR and Khareedu VR, 2018. Expression of hybrid fusion protein (Cry1Ac::ASAL) in transgenic rice plants imparts resistance against multiple insect pests. *Scientific Reports* 8, 8458.
- Deng J, Wang Y, Yang F, Liu Y and Liu B, 2019. Persistence of insecticidal Cry toxins in

- Bt rice residues under field conditions estimated by biological and immunological assays. *Science of the Total Environment* 679, 45-51.
- Dhanaraj AL, Willse AR and Kamath SP, 2019. Stability of expression of Cry1Ac and Cry2Ab2 proteins in Bollgard-II hybrids at different stages of crop growth in different genotypes across cropping seasons and multiple geographies. *Transgenic Research* 28, 33-50.
- Ding R, Ma D, Uwais A, Wang D, Liu J, Xu Y, Li H, Li H and Pan H, 2019. Transgenic Cry1Ac cotton does not affect the development and fecundity of *Chrysoperla carnea*. *Plos One* 14, e0214668.
- Dominguez-Mendez R, Alcantara-de la Cruz R, Rojano-Delgado AM, Silveira HMd, Portugal J, Cruz-Hipolito HE and Prado Rd, 2019. Stacked traits conferring multiple resistance to imazamox and glufosinate in soft wheat. *Pest Management Science* 75, 648-657.
- Dowd PF and Johnson ET, 2018. Overexpression of a maize (*Zea mays*) defensin-like gene in maize callus enhances resistance to both insects and fungi. *Agri Gene* 9, 16-23.
- Eghrari K, Brito AHd, Baldassi A, Balbuena TS, Fernandes OA and Moro GV, 2019. Homozygosis of Bt locus increases Bt protein expression and the control of *Spodoptera frugiperda* (Lepidoptera: Noctuidae) in maize hybrids. *Crop Protection* 124, 104871.
- Eisenring M, Naranjo SE, Bacher S, Abbott A, Meissle M and Romeis J, 2019. Reduced caterpillar damage can benefit plant bugs in Bt cotton. *Scientific Reports* 9, 2727.
- El-Husseini MMM, 2018. Impact of climate change induced by global weather engineering technology of "chemtrails" on plant protection. *Arab Journal of Plant Protection* 36, 80-85.
- Elumalai S, Samson N, Prairie A, Bradley D, Richbourg L, Strebe T, Liebler T, Wang D and Que Q, 2019. A study on optimization of pat gene expression cassette for maize transformation. *Molecular Biology Reports* 46, 3009-3017.
- Eski A, Demir I, Gullu M and Demirbag Z, 2018. Biodiversity and pathogenicity of bacteria associated with the gut microbiota of beet armyworm, *Spodoptera exigua* hubner (Lepidoptera: Noctuidae). *Microbial Pathogenesis* 121, 350-358.
- Fan S, Jarwar AH, Wang X, Wang L and Ma Q, 2018. Overview of the cotton in Pakistan and its future prospects. *Pakistan Journal of Agricultural Research* 31, 396-407.
- Fernandes MG, Araujo RPd, Costa EN, Zangirolmo ACTA and Pereira RM, 2019. Influence of Cry1Ac toxin from Bt cotton on the soil microbiota. *Journal of Agricultural Science (Toronto)* 11, 364-380.
- Fernandes MG, Costa EN, Dutra CC and Raizer J, 2019. Species richness and community composition of ants and beetles in Bt and non-Bt maize fields. *Environmental Entomology* 48, 1095-1103.
- Ferreira ACdB, Bogiani JC, Sofiatti V and Silva Filho Jld, 2018. Chemical control of stalk regrowth in glyphosate-resistant transgenic cotton. *Revista Brasileira de Engenharia Agricola e Ambiental* 22, 530-534.
- Figueiredo CS, Lemes ARN, Sebastiao I and Desiderio JA, 2019. Synergism of the *Bacillus thuringiensis* Cry1, Cry2, and Vip3 proteins in *Spodoptera frugiperda* control. *Applied Biochemistry and Biotechnology* 188, 798-809.
- Fleming D, Musser F, Reisig D, Greene J, Taylor S, Megha P, Lorenz G, Catchot A, Gore J, Kerns D, Stewart S, Boykin D, Caprio M and Little N, 2018. Effects of transgenic *Bacillus thuringiensis* cotton on insecticide use, heliothine counts, plant damage, and cotton yield: a meta-analysis, 1996-2015. *Plos One* 13, e0200131.
- Fritz ML, DeYonke AM, Papanicolaou A, Micinski S, Westbrook J and Gould F, 2018.

- Contemporary evolution of a Lepidopteran species, *Heliothis virescens*, in response to modern agricultural practices. *Molecular Ecology* 27, 167-181.
- Funichello M, Fraga DF, Prado EP, Aguirre-Gil OJ and Busoli AC, 2019. Vertical distribution of *Crysothrips includens* (Lepidoptera: Noctuidae) in transgenic and conventional cotton cultivars
- Distribuição vertical de *Crysothrips includens* (Lepidoptera: Noctuidae) em cultivar transgênica e convencional de algodoeiro. *Revista de Ciências Agroveterinárias* 18, 150-153.
- Gagandeep K, Guo J, Brown S, Head GP, Price PA, Paula-Moraes S, Ni X, Dimase M and Huang F, 2019. Field-evolved resistance of *Helicoverpa zea* (Boddie) to transgenic maize expressing pyramided Cry1A.105/Cry2Ab2 proteins in northeast Louisiana, the United States. *Journal of Invertebrate Pathology* 163, 11-20.
- Gao M, Wang X, Yang Y, Tabashnik BE and Wu Y, 2018. Epistasis confers resistance to Bt toxin Cry1Ac in the cotton bollworm. *Evolutionary Applications* 11, 809-819.
- Geng L, Xu D, Zhang M, Shu C, Feng J, Song F, Lu F and Zhang J, 2018. High-throughput sequencing-based analysis of the intestinal microbiota of broiler chickens fed genetically modified rice expressing Cry1Ac/Cry1Ab chimeric *Bacillus thuringiensis* protein. *Journal of Poultry Science* 55, 10-16.
- Ghulam A, Abma-Henkens MHC, Werf Wvd, Hemerik L and Vlak JM, 2018. Genotype assembly, biological activity and adaptation of spatially separated isolates of *Spodoptera litura* nucleopolyhedrovirus. *Journal of Invertebrate Pathology* 153, 20-29.
- Grimi DA, Parody B, Ramos ML, Machado M, Ocampo F, Willse A, Martinelli S and Head G, 2018. Field-evolved resistance to Bt maize in sugarcane borer (*Diatraea saccharalis*) in Argentina. *Pest Management Science* 74, 905-913.
- Guo J, Yang F, Brown S, Kern D, Head GP, Price PA, Niu Y and Huang F, 2019. Fecundity of the parental and fitness of the F1 populations of corn earworm from refuge ears of seed blend plantings with Genuity SmartStax™ maize. *Crop Protection* 124, 104873.
- Guo W, Kain W and Wang P, 2019. Effects of disruption of the peritrophic membrane on larval susceptibility to Bt toxin Cry1Ac in cabbage loopers. *Journal of insect physiology* 117, 103897.
- Gurlal S, Dwivedi SK and Ravinder N, 2018. Mechanism of resistance for field insects in Bt crops and its management. *Annals of Biology* 34, 152-154.
- Hagenbucher S, Eisenring M, Meissle M, Rathore KS and Romeis J, 2019. Constitutive and induced insect resistance in RNAi-mediated ultra-low gossypol cottonseed cotton. *Bmc Plant Biology* 19, (18 July 2019).
- Han C, Liu B and Zhong W, 2018. Effects of transgenic Bt rice on the active rhizospheric methanogenic archaeal community as revealed by DNA-based stable isotope probing. *Journal of applied microbiology* 125, 1094-1107.
- Herman RA, Ekmay RD, Schafer BW, Song P, Fast BJ, Papineni S, Shan G and Juberg DR, 2018. Food and feed safety of DAS-44406-6 herbicide-tolerant soybean. *Regulatory Toxicology and Pharmacology* 94, 70-74.
- Hu Q, Min L, Yang X, Jin S, Zhang L, Li Y, Ma Y, Qi X, Li D, Liu H, Lindsey K, Zhu L and Zhang X, 2018. Laccase GhLac1 modulates broad-spectrum biotic stress tolerance via manipulating phenylpropanoid pathway and jasmonic acid synthesis. *Plant physiology* 176, 1808-1823.
- Hu W, Deng X, Deng X, Deng L, Xiao Y, He X, Fu X and Xiao G, 2018. Characteristic analysis of tetra-resistant genetically modified rice. *Journal of Integrative*

- Agriculture 17, 493-506.
- Ingber DA, Mason CE and Flexner L, 2018. Cry1 Bt susceptibilities of fall armyworm (Lepidoptera: Noctuidae) host strains. *Journal of Economic Entomology* 111, 361-368.
- Intazar A, Shuai Z, Asif S, Hafiz M-u-R and Cui J, 2018. Artificial diet based investigation on the impact of purified Cry1Ac, Cry1Fa and Cry2Ab on the survival and reproductive performance of adult green lacewing, *Chrysopa pallens* (Rambur) (Neuroptera: Chrysopidae). *Phytoparasitica* 46, 127-135.
- Jadhav MP and Katageri IS, 2018. In planta genetic transformation in cotton (*Gossypium* spp.). *Journal of Farm Sciences* 31, 27-31.
- Jagmit S, Dharminder S and Sukhdev S, 2019. Farmers' perception and evaluation of Bt cotton cultivation in Punjab. *Agricultural Research Journal* 56, 556-563.
- Jerga A, Evdokimov AG, Moshiri F, Haas JA, Chen M, Clinton W, Fu X, Halls C, Jimenez-Juarez N, Kretzler CN, Panosian TD, Pleau M, Roberts JK, Rydel TJ, Salvador S, Sequeira R, Wang Y, Zheng M and Baum JA, 2019. Disabled insecticidal proteins: a novel tool to understand differences in insect receptor utilization. *Insect Biochemistry and Molecular Biology* 105, 79-88.
- Jin M, Liao C, Swapan C, Wu K and Xiao Y, 2019. Comparative proteomics of peritrophic matrix provides an insight into its role in Cry1Ac resistance of cotton bollworm *Helicoverpa armigera*. *Toxins* 11, 92.
- Kahn TW, Chakroun M, Williams J, Walsh T, James B, Monserrate J and Ferre J, 2018. Efficacy and resistance management potential of a modified Vip3C protein for control of *Spodoptera frugiperda* in maize. *Scientific Reports* 8, 16204.
- Kamaraj C, Balasubramani G, Deepak P, Aiswarya D, Arul D, Amutha V, Karthi S and Perumal P, 2018. Bio-pesticidal effects of *Trichoderma viride* formulated titanium dioxide nanoparticle and their physiological and biochemical changes on *Helicoverpa armigera* (Hub.). *Pesticide Biochemistry and Physiology* 149, 26-36.
- Khabbazi SD, Khabbazi AD, Ozcan SF, Bakhsh A, Basalma D and Ozcan S, 2018. Expression of GNA and biting site-restricted cry1Ac in cotton; an efficient attribution to insect pest management strategies. *Plant Biotechnology Reports* 12, 273-282.
- Khaing M, Yang X, Zhao M, Zhang W, Wang B, Wei J and Liang G, 2018. Effects of antibiotics on biological activity of Cry1Ac in bt-susceptible and bt-resistant *Helicoverpa armigera* strains. *Journal of Invertebrate Pathology* 151, 197-200.
- Khan MI, Khan AA, Cheema HMN and Khan RSA, 2018. Spatio-temporal and intra-plant expression variability of insecticidal gene (Cry1Ac) in upland cotton. *International Journal of Agriculture and Biology* 20, 715-722.
- Kukanur VS, Singh TVK and Kranthi KR, 2018. Fitness costs of resistance to cry1Ac toxin in *Helicoverpa armigera* (Hubner). *Indian Journal of Entomology* 80, 460-466.
- Kukanur VS, Singh TVK, Kranthi KR and Andow DA, 2018. Cry1Ac resistance allele frequency in field populations of *Helicoverpa armigera* (Hubner) collected in Telangana and Andhra Pradesh, India. *Crop Protection* 107, 34-40.
- Labade CP, Jadhav AR, Mehul A, Zinjarde SS and Tamhane VA, 2018. Role of induced glutathione-S-transferase from *Helicoverpa armigera* (Lepidoptera: Noctuidae) HaGST-8 in detoxification of pesticides. *Ecotoxicology and Environmental Safety* 147, 612-621.
- Leite NA, Pereira RM, Durigan MR, Amado D, Fatoletto J, Medeiros FCL and Omoto C, 2018. Susceptibility of Brazilian populations of *Helicoverpa armigera* and *Helicoverpa zea* (Lepidoptera: Noctuidae) to Vip3Aa20. *Journal of Economic*

- Entomology 111, 399-404.
- Levine SL, Fridley JM and Uffman JP, 2019. Assessing the potential for interaction in insecticidal activity between MON 87751 * MON 87701 produced by conventional breeding. *Environmental Entomology* 48, 1241-1248.
- Li G, Gao L, Huang J, Ji T, Huang B, Tian C, Lu Y and Feng H, 2018. Frequency of Bt resistant alleles in wild cotton bollworm populations. *Chinese Journal of Applied Entomology* 55, 49-54.
- Li L, Luo J, Wu Y, Zhu X, Li C and Cui J, 2018. The effects of transgenic Cry1Ac/1Ab cotton on cotton bollworm control and growth and development of non-target pests. *Journal of Plant Protection* 45, 561-567.
- Li P, Li Y, Shi J, Yu Z, Pan A, Tang X and Ming F, 2018. Impact of transgenic Cry1Ac + CpTI cotton on diversity and dynamics of rhizosphere bacterial community of different root environments. *Science of the Total Environment* 637/638, 233-243.
- Li S, Wang Z, Zhou Y, Li C, Wang G, Wang H, Zhang J, Liang G and Lang Z, 2018. Expression of cry2Ah1 and two domain II mutants in transgenic tobacco confers high resistance to susceptible and Cry1Ac-resistant cotton bollworm. *Scientific Reports* 8, 508.
- Li X, Zhao F, Qiu X, Ren X, Mo X, Ding X, Xia L and Sun Y, 2018. The full-length Cry1Ac protoxin without proteolytic activation exhibits toxicity against insect cell line CF-203. *Journal of Invertebrate Pathology* 152, 25-29.
- Li Z, Bu N, Chen X, Cui J, Xiao M, Song Z, Nie M and Fang C, 2018. Soil incubation studies with Cry1Ac protein indicate no adverse effect of Bt crops on soil microbial communities. *Ecotoxicology and Environmental Safety* 152, 33-41.
- Li Z, Zhang L, Zhang X, Shu J, Su Y, Sun J, Liu Y, Fang Z, Yang L, Zhuang M, Zhang Y and LuHongHao, 2018. Studies on identification methods in backcross generation of Cry1Ac-transgenic broccoli. *Acta Horticulturae Sinica* 45, 97-108.
- Li R, Yang S, Qiu X, Lu X, Hu Q, Ren X, Wu B, Qi L, Ding X, Xia L and Sun Y, 2019. The conserved cysteine residues in *Bacillus thuringiensis* Cry1Ac protoxin are not essential for the bipyrimal crystal formation. *Journal of Invertebrate Pathology* 163, 82-85.
- Li S, Hussain F, Unnithan GC, Dong S, Zain ul A, Gu S, Mathew LG, Fabrick JA, Ni X, Carriere Y, Tabashnik BE and Li X, 2019. A long non-coding RNA regulates cadherin transcription and susceptibility to Bt toxin Cry1Ac in pink bollworm, *Pectinophora gossypiella*. *Pesticide Biochemistry and Physiology* 158, 54-60.
- Lin L, Shao E, Chen X, Zhang J, Huang T and Guan X, 2018. Expression of membrane-bound APN from brown planthopper (*Nilaparvata lugens*) midgut epithelial membrane in Sf9 cell line. *Journal of Agricultural Biotechnology* 26, 839-848.
- Little NS, Elkins BH, Mullen RM, Perera OP, Parys KA, Allen KC and Boykin DL, 2019. Differences between two populations of bollworm, *Helicoverpa zea* (Lepidoptera: Noctuidae), with variable measurements of laboratory susceptibilities to Bt toxins exposed to non-Bt and Bt cottons in large field cages. *Plos One* 14, e0212567.
- Liu C, Zhang D, Wang Z, Chen L, Li G and Liang G, 2018. Resistance, and cross-resistance, of *Helicoverpa armigera* to different Bt proteins. *Chinese Journal of Applied Entomology* 55, 55-60.
- Liu D, Huang X, Jing W, An X, Zhang Q, Zhang H, Zhou J, Zhang Y and Guo Y, 2018. Identification and functional analysis of two P450 enzymes of *Gossypium hirsutum* involved in DMNT and TMTT biosynthesis. *Plant Biotechnology Journal* 16, 581-590.
- Liu L, Chen Z, Yang Y, Xiao Y, Liu C, Ma Y, Soberon M, Bravo A, Yang Y and Liu K,

2018. A single amino acid polymorphism in ABCC2 loop 1 is responsible for differential toxicity of *Bacillus thuringiensis* Cry1Ac toxin in different *Spodoptera* (Noctuidae) species. *Insect Biochemistry and Molecular Biology* 100, 59-65.
- Liu M, Zhang X, Gao Y, Shen Z and Lin C, 2018. Molecular characterization and efficacy evaluation of a transgenic corn event for insect resistance and glyphosate tolerance. *Journal of Zhejiang University (Science B)* 19, 610-619.
- Liu T, Chen X, Qi L, Chen F, Liu M and Whalen JK, 2018. Root and detritus of transgenic Bt crop did not change nematode abundance and community composition but enhanced trophic connections. *Science of the Total Environment* 644, 822-829.
- Liu X, Cui X, Sun B, Chen L and Wang W, 2018. Breeding of conventional cotton variety 'Simian 6821'. *Acta Agriculturae Shanghai* 34, 79-84.
- Liu A, Huang X, Gong L, Guo Z, Zhang Y and Yang Z, 2019. Characterization of immune-related PGRP gene expression and phenoloxidase activity in Cry1Ac-susceptible and -resistant *Plutella xylostella* (L.). *Pesticide Biochemistry and Physiology* 160, 79-86.
- Liu Y, Li Y, Chen X, Song X, Shen P and Peng Y, 2019. No detrimental effect of Bt maize pollen containing Cry1Ab/2Aj or Cry1Ac on adult green lacewings *Chrysoperla sinica* Tjeder. *Journal of Integrative Agriculture* 18, 893-899.
- Liu Z, Zhao D, Chang M, Zhang Y, Xu C, Lu X and Guo W, 2019. Gene cloning of *Hyphantria cunea* midgut aminopeptidase N and its binding characteristics with three *Bacillus thuringiensis* toxins. *Acta Sericologica Sinica* 24-31.
- Lu X, Jiang D, Yan J, Ma Zhen E, Luo X, Wei T, Xu Y and He Q, 2018. An ultrasensitive electrochemical immunosensor for Cry1Ab based on phage displayed peptides. *Talanta* 179, 646-651.
- Luo J, Zhang S, Zhu X, Ji J, Zhang K, Wang C, Zhang L, Wang L and Cui J, 2018. Effect of nacl-stressed *Bacillus thuringiensis* (Bt) cotton on the feeding behaviors and nutritional parameters of *Helicoverpa armigera*. *Plos One* 13, e0198570.
- Mahrukh Z, Ayesha L, Abdul Qayyum R, Saira A, Naila S, Samiullah TR, Aneela Y, Shahid AA, Nasir IA and Tayyab H, 2019. A combinational approach of enhanced methanol production and double Bt genes for broad spectrum insect resistance in transgenic cotton. *Molecular biotechnology* 61, 663-673.
- Maitri S and Pundir RS, 2018. Analysis on impact and constraints of Bt cotton cultivation in Middle Gujarat. *International Journal of Forestry and Crop Improvement* 9, 18-23.
- Maniraj R, Karthik K, Shweta S, Vinutha T, Vandna R, Debasis P and Rohini S, 2019. Molecular interaction-based exploration of the broad spectrum efficacy of a *Bacillus thuringiensis* insecticidal chimeric protein, Cry1AcF. *Toxins* 11, 143.
- Manoj K, Yusuf MA, Manisha N and Manoj K, 2018. An update on genetic modification of chickpea for increased yield and stress tolerance. *Molecular biotechnology* 60, 651-663.
- Marques LH, Santos AC, Castro BA, Storer NP, Babcock JM, Lepping MD, Sa V, Moscardini VF, Rule DM and Fernandes OA, 2018. Impact of transgenic soybean expressing Cry1Ac and Cry1F proteins on the non-target arthropod community associated with soybean in Brazil. *Plos One* 13, e0191567.
- Marques LH, Santos AC, Castro BA, Moscardini VF, Rosseto J, Silva OABN and Babcock JM, 2019. Assessing the efficacy of *Bacillus thuringiensis* (Bt) pyramided proteins Cry1F, Cry1A.105, Cry2Ab2, and Vip3Aa20 expressed in Bt maize against lepidopteran pests in Brazil. *Journal of Economic Entomology* 112, 803-811.
- Martinez-Solis M, Pinos D, Endo H, Portugal L, Sato R, Ferre J, Herrero S and Hernandez-

- Martinez P, 2018. Role of *Bacillus thuringiensis* Cry1A toxins domains in the binding to the ABCC2 receptor from *Spodoptera exigua*. *Insect Biochemistry and Molecular Biology* 101, 47-56.
- Mathew LG, Ponnuraj J, Mallappa B, Chowdary LR, Zhang J, Tay W, Walsh TK, Gordon KHJ, Heckel DG, Downes S, Carriere Y, Li X, Tabashnik BE and Fabrick JA, 2018. ABC transporter mis-splicing associated with resistance to Bt toxin Cry2Ab in laboratory- and field-selected pink bollworm. *Scientific Reports* 8, 13531.
- McPherson K, Lorenz G, Taillon N, Plummer A, Bateman N, Thrash B, Black J, Cato A, McCullars L and Pace J, 2018. Comparison of Bollgard II and Bollgard II Xtend cotton cultivars for control of cotton bollworm, *Helicoverpa zea* (Boddie), in the mid-South. *Research Series - Arkansas Agricultural Experiment Station* 64-67.
- Meissle M and Romeis J, 2018. Transfer of Cry1Ac and Cry2Ab proteins from genetically engineered Bt cotton to herbivores and predators. *Insect Science* 25, 823-832.
- Mirzaei S, Dezhsetan S and Tohidfar M, 2018. Stacking of cry1Ab and Chitinase genes in commercial cotton varieties through crossing. *Journal of Agricultural Science and Technology* 20, 1259-1268.
- Moussa S, Baiomy F, Abouzaid K, Nasr M, Moussa EM and Kamel EA, 2018. Potential impact of host pest fed on Bt-modified corn on the development of *Chrysoperla carnea* (Stephens) (Neuroptera: Chrysopidae). *Egyptian Journal of Biological Pest Control* 28, (15 March 2018).
- Murua MG, Vera MA, Herrero MI, Fogliata SV and Michel A, 2018. Defoliation of soybean expressing Cry1Ac by lepidopteran pests. *Insects* 9, 93.
- Naegeli H, Birch AN, Casacuberta J, Schrijver Ad, Gralak MA, Guerche P, Jones H, Manachini B, Messean A, Nielsen EE, Nogue F, Robaglia C, Rostoks N, Sweet J, Tebbe C, Visioli F, Wal JM, Alvarez F, Ardizzone M, Paraskevopoulos K, Broll H, Devos Y, Dumont AF, Ruiz JAG, Lanzoni A and Neri FM, 2018. Assessment of genetically modified maize 4114 for food and feed uses, under Regulation (EC) No 1829/2003 (application EFSA-GMO-NL-2014-123). *Efsa Journal* 16, e05280.
- Naik VCB, Sujit K, Sandhya K, Usha S and Kranthi KR, 2018. Field-evolved resistance of pink bollworm, *Pectinophora gossypiella* (Saunders) (Lepidoptera: Gelechiidae), to transgenic *Bacillus thuringiensis* (Bt) cotton expressing crystal 1Ac (Cry1Ac) and Cry2Ab in India. *Pest Management Science* 74, 2544-2554.
- Nakaishi Y, Sato M, Bando H and Asano S, 2018. A mutation in *Plutella xylostella* ABCC2 causes resistance to *Bacillus thuringiensis* Cry1Ac by interfering with its receptor function. *Journal of Insect Biotechnology and Sericology* 87, 45-51.
- Nava-Camberos U, Avila-Rodriguez V, Maltos-Buendia J, Garcia-Hernandez JL and Martinez-Carrillo JL, 2018. Populations and damages of insect pests in conventional and Bt cotton in the Comarca Lagunera, Mexico
- Densidades y danos de insectos plaga en algodono convencional y Bt en la Comarca Lagunera, Mexico. *Southwestern Entomologist* 43, 985-993.
- Nazir MS, Malik TA, Shakeel A and Ahmad JN, 2019. Potential resistance of okra leaf Bt cotton against insect pests. *Applied Ecology and Environmental Research* 17, 5465-5469.
- Nichols RL, 2018. Impacts of weed resistance to herbicides on United States (U.S.) cotton (*Gossypium hirsutum*) production. *Outlooks on Pest Management* 29, 5-9.
- Niu L, Tian Z, Liu H, Zhou H, Ma W, Lei C and Chen L, 2018. Transgenic Bt cotton expressing Cry1Ac/Cry2Ab or cry1ac/EPSPS does not affect the plant bug *Adelphocoris suturalis* or the pollinating beetle *Haptoncus luteolus*. *Environmental Pollution* 234, 788-793.

-
- Onstad DW, Crespo ALB, Pan Z, Crain PR, Thompson SD, Pilcher CD and Amit S, 2018. Blended refuge and insect resistance management for insecticidal corn. *Environmental Entomology* 47, 210-219.
- Osorio-Almanza L, Burbano-Figueroa O and Martinez-Reina A, 2018. Technical feasibility of genetically engineered cotton varieties expressing Cry proteins against *Anthonomus grandis* in the Sinu Valley, Colombia
- Factibilidad tecnica de variedades de algodón expresando proteínas Cry tóxicas contra *Anthonomus grandis* en el Valle del Sinu, Colombia. *Revista Ciencia y Agricultura* 15, 47-60.
- Pandey SP, Singh AP, Srivastava S, Krishnappa C and Sane AP, 2019. A strong early acting wound-inducible promoter, rbPCD1pro, activates cryIAC expression within minutes of wounding to impart efficient protection against insects. *Plant Biotechnology Journal* 17, 1458-1470.
- Panwar BS, Jaswinder K, Pradyumn K and Sarvjeet K, 2018. A novel cry52Ca1 gene from an Indian *Bacillus thuringiensis* isolate is toxic to *Helicoverpa armigera* (cotton boll worm). *Journal of Invertebrate Pathology* 159, 137-140.
- Papineni S, Passage JK, Ekmay RD and Thomas J, 2018. Evaluation of 30% DAS-44406-6 soybean meal in a subchronic rat toxicity study. *Regulatory Toxicology and Pharmacology* 94, 57-69.
- Paulo PD, Fadini MAM, Dominiquini AB, Mendes SM and Marinho CGS, 2018. Cry protein in the predatory mite *Neoseiulus californicus* and spider mite *Tetranychus urticae* prey fed with transgenic maize. *Brazilian Journal of Biology* 78, 91-93.
- Paulo PDD, Fadini MAM, Marinho CGS and Mendes SM, 2019. Direct defense elicited by *Tetranychus urticae* Koch (Acari: Tetranychidae) in Bt maize plants. *Bioscience Journal* 35, 903-909.
- Peng C, Chen X, Wang X, Xu X, Wei W, Wang C and Xu J, 2018. Comparative analysis of miRNA expression profiles in transgenic and non-transgenic rice using miRNA-Seq. *Scientific Reports* 8, 338.
- Peterson JA, Burkness EC, Harwood JD and Hutchison WD, 2018. Molecular gut-content analysis reveals high frequency of *Helicoverpa zea* (Lepidoptera: Noctuidae) consumption by *Orius insidiosus* (Hemiptera: Anthocoridae) in sweet corn. *Biological Control* 121, 1-7.
- Pinos D, Martinez-Solis M, Herrero S, Ferre J and Hernandez-Martinez P, 2019. The *Spodoptera exigua* ABCC2 acts as a Cry1A receptor independently of its nucleotide binding domain II. *Toxins* 11, 172.
- Prodhan MZH, Hasan MT, Chowdhury MMI, Alam MS, Rahman ML, Azad AK, Hossain MJ, Naranjo SE and Shelton AM, 2018. Bt eggplant (*Solanum melongena* L.) in Bangladesh: fruit production and control of eggplant fruit and shoot borer (*Leucinodes orbonalis* Guenee), effects on non-target arthropods and economic returns. *Plos One* 13, e0205713.
- Qiu L, Wang P, Wu T, Li B, Wang X, Lei C, Lin Y, Zhao J and Ma W, 2018. Downregulation of *Chilo suppressalis* alkaline phosphatase genes associated with resistance to three transgenic *Bacillus thuringiensis* rice lines. *Insect Molecular Biology* 27, 83-89.
- Qiu L, Sun Y, Jiang Z, Yang P, Liu H, Zhou H, Wang X, Zhang W, Lin Y and Ma W, 2019. The midgut V-ATPase subunit A gene is associated with toxicity to crystal 2Aa and crystal 1Ca-expressing transgenic rice in *Chilo suppressalis*. *Insect Molecular Biology* 28, 520-527.
- Rao VS, 2018. Herbicide resistant biotech crops and their import to Indian agriculture.

- Indian Journal of Weed Science 50, 223-238.
- Rao W, Zhan Y, Chen S, Xu Z, Huang T, Hong X, Zheng Y, Pan X and Guan X, 2018. Flowerlike Mg(OH)₂ cross-nanosheets for controlling Cry1Ac protein loss: evaluation of insecticidal activity and biosecurity. *Journal of Agricultural and Food Chemistry* 66, 3651-3657.
- Rehana A, Baloch MJ, Baloch GM and Qamaruddin C, 2018. Combining ability estimates for yield and fibre quality traits in Bt and non-Bt upland cotton genotypes. *Pure and Applied Biology* 7, 389-399.
- Reinoso-Pozo Y, Rincon-Castro MCd and Ibarra JE, 2018. Significant increase in toxicity of the Cry1Ac1 protein of *Bacillus thuringiensis* by the exchange of two amino acids in its domain III. *Biological Control* 125, 1-6.
- Reisig DD, Huseeth AS, Bacheler JS, Aghaee MA, Braswell L, Burrack HJ, Flanders K, Greene JK, Herbert DA, Jacobson A, Paula-Moraes SV, Roberts P and Taylor SV, 2018. Long-term empirical and observational evidence of practical *Helicoverpa zea* resistance to cotton with pyramided Bt toxins. *Journal of Economic Entomology* 111, 1824-1833.
- Reisig DD and Kurtz R, 2018. Bt resistance implications for *Helicoverpa zea* (Lepidoptera: Noctuidae) insecticide resistance management in the United States. *Environmental Entomology* 47, 1357-1364.
- Rendon D, Taylor PW, Wilder SM and Whitehouse MEA, 2019. Does prey encounter and nutrient content affect prey selection in wolf spiders inhabiting Bt cotton fields? *Plos One* 14, e0210296.
- Rodrigues-Silva N, Canuto AF, Oliveira DF, Teixeira AF, Santos-Amaya OF, Picanco MC and Pereira EJG, 2019. Negative cross-resistance between structurally different *Bacillus thuringiensis* toxins may favor resistance management of soybean looper in transgenic Bt cultivars. *Scientific Reports* 9, 199.
- Rubina M, Shakoori AR and Jurat-Fuentes JL, 2018. Domain III of Cry1Ac is critical to binding and toxicity against soybean looper (*Chrysodeixis includens*) but not to velvetbean caterpillar (*Anticarsia gemmatilis*). *Toxins* 10, 95.
- Saleem MF, Abdul S, Muhammad S, Cheema MA, Amir S, Muhammad S, Tahir MU and Bilal MF, 2018. Removal of early fruit branches as potential regulator of Cry1Ac, antioxidants, senescence and yield in Bt. cotton. *Industrial Crops and Products* 124, 885-898.
- Saleem MJ, Muhammad A, Sohail A and Sahi ST, 2019. Variation in susceptibility of *Helicoverpa armigera* (Lepidoptera: Noctuidae) to Cry1Ac toxin. *Pakistan Journal of Agricultural Sciences* 56, 415-420.
- Saleh H, Abdelrazak A, Elsayed A, El-Shishtawy H and Osman Y, 2018. Optimizing production of a biopesticide protectant by black yeast. *Egyptian Journal of Biological Pest Control* 28, (6 September 2018).
- Salisu IB, Shahid AA, Amina Y, Rao AQ and Tayyab H, 2019. Effect of dietary supplementation of recombinant Cry and Cp4 epsps proteins on haematological indices of growing rabbits. *Journal of animal physiology and animal nutrition* 103, 305-316.
- Santos-Vigil KI, Ilhuicatz-Alvarado D, Garcia-Hernandez AL, Herrera-Garcia JS and Moreno-Fierros L, 2018. Study of the allergenic potential of *Bacillus thuringiensis* Cry1Ac toxin following intra-gastric administration in a murine model of food-allergy. *International immunopharmacology* 61, 185-196.
- Seide VE, Bernardes RC, Pereira EJG and Lima MAP, 2018. Glyphosate is lethal and Cry toxins alter the development of the stingless bee *Melipona quadrifasciata*.

- Environmental Pollution 243, 1854-1860.
- Sellami S, Jemli S, Abdelmalek N, Cherif M, Abdelkefi-Mesrati L, Tounsi S and Jamoussi K, 2018. A novel Vip3Aa16-Cry1Ac chimera toxin: enhancement of toxicity against *Ephestia kuehniella*, structural study and molecular docking. *International Journal of Biological Macromolecules* 117, 752-761.
- Shabbir MZ, Quan Y, Wang Z, Bravo A, Soberon M and He K, 2018. Characterization of the Cry1Ah resistance in Asian corn borer and its cross-resistance to other *Bacillus thuringiensis* toxins. *Scientific Reports* 8, 234.
- Shahid MR, Muhammad S, Muhammad F, Arain MS, Hanif CMS, Yin H, Muhammad A and Saghir A, 2018. Earliness index deters *Pectinophora gossypiella* incidence on advanced cultivars of Bt cotton. *Arthropod - Plant Interactions* 12, 303-309.
- Shakeel A, Cheema HMN, Khan AA, Khan RSA and Ahmad JN, 2019. Resistance status of *Helicoverpa armigera* against Bt cotton in Pakistan. *Transgenic Research* 28, 199-212.
- Shao E, Chen C, Chen H, Liu S, Lin L, Wang Y, Guan X and Huang Z, 2018. In vitro hydrolysis of *Bacillus thuringiensis* Cry1Ac toxin by gut proteases of *Nilaparvata lugens* (Stål) and binding assays of Cry1Ac toxin with brush border membrane of *N. lugens* midgut. *Biocontrol Science and Technology* 28, 446-458.
- Sharma HC and Dhillon MK, 2018. Bio-safety of *Helicoverpa*-resistant transgenic chickpea with *Bacillus thuringiensis* genes in the environment. *Indian Journal of Agricultural Sciences* 88, 820-827.
- Shaukat A, Aamir R, Zia MA, Khan SU, Arshad I and Ali GM, 2018. Temporal status of Bt gene expression in Pakistani cotton. *Pakistan Journal of Agricultural Sciences* 55, 143-150.
- Shen X, Wang Y, Zhang Y, Guo W, Jiao Y and Zhou X, 2018. Overexpression of the wild soybean R2R3-MYB transcription factor GsMYB15 enhances resistance to salt stress and *Helicoverpa armigera* in transgenic *Arabidopsis*. *International Journal of Molecular Sciences* 19, 3958.
- Shweta S, Kumar NR, Maniraj R, Lakshmikanth R, Rao KYS, Muralimohan N, Arulprakash T, Karthik K, Shashibhushan NB, Vinutha T, Debasis P, Dash PK, Kumar PA and Rohini S, 2018. Expression of Cry2Aa, a *Bacillus thuringiensis* insecticidal protein in transgenic pigeon pea confers resistance to gram pod borer, *Helicoverpa armigera*. *Scientific Reports* 8, 8820.
- Siddiqui HA, Muhammad A, Shaheen A, Naqvi RZ, Sobia A, Noroza U, Naveed A, Imran R, Muhammad S, Muhammad A, Imran A, Muhammad S, Zahid M, Aftab B and Shahid M, 2019. Development and evaluation of double gene transgenic cotton lines expressing Cry toxins for protection against chewing insect pests. *Scientific Reports* 9, 11774.
- Silva IHSd, Gomez I, Sanchez J, Castro DLMd, Valicente FH, Soberon M, Polanczyk RA and Bravo A, 2018. Identification of midgut membrane proteins from different instars of *Helicoverpa armigera* (Lepidoptera: Noctuidae) that bind to Cry1Ac toxin. *Plos One* 13, e0207789.
- Silva LM, Silva MC, Silva SMFA, Alves RC, Siqueira HAA and Marques EJ, 2018. Toxin gene contents and activity of *Bacillus thuringiensis* strains against two sugarcane borer species, *Diatraea saccharalis* (F.) and *D. flavipennella* (Box). *Neotropical Entomology* 47, 292-301.
- Silva Gd, Ramos LFC, Seckler HdS, Gomes FM, Cortines JR, Ramos I, Anobom CD, Machado EdA and Oliveira DMPd, 2019. Biochemical characterization of digestive membrane-associated alkaline phosphatase from the velvet bean caterpillar

- Anticarsia gemmatalis*. Archives of Insect Biochemistry and Physiology 102, e21591.
- Smith JL, Baute TS, Sebright MM, Schaafsma AW and DiFonzo CD, 2018. Establishment of *Striacosta albicosta* (Lepidoptera: Noctuidae) as a primary pest of corn in the Great Lakes region. Journal of Economic Entomology 111, 1732-1744.
- Smith JL, Limay-Rios V, Hooker DC and Schaafsma AW, 2018. *Fusarium graminearum* mycotoxins in maize associated with *Striacosta albicosta* (Lepidoptera: Noctuidae) injury. Journal of Economic Entomology 111, 1227-1242.
- Song P, Yang Y, Nangong Z, Guo L, Wang Z and Wang Q, 2018. Toxicity of *Bacillus thuringiensis* toxin proteins against *Athetis lepigone* larvae and histopathology of the midgut of the larvae. Journal of Plant Protection 45, 1349-1355.
- Song X, Chang L, Reddy GVP, Zhang L, Fan C and Wang B, 2019. Use of taxonomic and trait-based approaches to evaluate the effects of transgenic Cry1Ac corn on the community characteristics of soil Collembola. Environmental Entomology 48, 263-269.
- Sousa MFd, Fernandes MG and Guimaraes AJdS, 2019. Influence of Bt maize on diversity and composition of non-target arthropod species. Journal of Agricultural Science (Toronto) 11, 201-209.
- Souza CSF, Silveira LCP, Paula DP, Andow DA and Mendes SM, 2018. Transfer of Cry1F from Bt maize to eggs of resistant *Spodoptera frugiperda*. Plos One 13, e0203791.
- Souza CSF, Silveira LCP, Pitta RM, Waquil JM, Pereira EJG and Mendes SM, 2019. Response of field populations and Cry-resistant strains of fall armyworm to Bt maize hybrids and Bt-based bioinsecticides. Crop Protection 120, 1-6.
- Suassuna ND, Morello CdL, Pedrosa MB, Barroso PAV, Silva Filho Jld, Suassuna TdMF, Perina FJ, Sofiatti V, Magalhaes FOdC and Farias FJC, 2018. BRS 430 B2RF and BRS 432 B2RF: insectresistant and glyphosate-tolerant high-yielding cotton cultivars. Crop Breeding and Applied Biotechnology 18, 221-225.
- Subbanna ARNS, Khan MS, Stanley J and Babu BK, 2018. Diversity of *Bacillus thuringiensis* isolates native to Uttarakhand Himalayas, India and their bioefficacy against selected insect pests. Proceedings of the National Academy of Sciences India Section B, Biological Sciences 88, 1489-1498.
- Sumit Y, Godara AK and Yadav VPS, 2018. Impact of Bt cotton production technology in Haryana. Indian Research Journal of Extension Education 18, 66-71.
- Tang Q, Yang Z, Han R, Zhang Y, Shen C and Wang J, 2019. No effect of Bt-transgenic rice on the tritrophic interaction of the stored rice, the maize weevil *Sitophilus zeamais* and the parasitoid wasp *Theocolax elegans*. Scientific Reports 9, 4306.
- Tariku Tesfaye E, 2019. Review on bio-intensive management of African bollworm, *Helicoverpa armigera* (Hub.): botanicals and semiochemicals perspectives. African Journal of Agricultural Research 14, 1-9.
- Tessnow AE, Behmer ST, Walsh TK and Sword GA, 2018. Protein-carbohydrate regulation in *Helicoverpa armigera* and *H. punctigera* and how diet protein-carbohydrate content affects insect susceptibility to Bt toxins. Journal of insect physiology 106, 88-95.
- Thornby D, Werth J, Hereward J, Keenan M and Chauhan BS, 2018. Herbicide resistance evolution can be tamed by diversity in irrigated Australian cotton: a multi-species, multi-herbicide modelling approach. Pest Management Science 74, 2363-2375.
- Tian J, Wang X, Chen Y, Romeis J, Naranjo SE, Hellmich RL, Wang P and Shelton AM, 2018. Bt cotton producing Cry1Ac and Cry2Ab does not harm two parasitoids, *Cotesia marginiventris* and *Copidosoma floridanum*. Scientific Reports 8, 307.

- Tuyet Thi Anh L, Cribb BW, Downes SJ, Perkins LE and Zalucki MP, 2019. Stay or move: how Bt-susceptible *Helicoverpa armigera* neonates behave on Bt cotton plants. *Entomologia Experimentalis Et Applicata* 167, 868-879.
- Vanti GL, Katageri IS, Inamdar SR, Hiremathada V and Swamy BM, 2018. Potent insect gut binding lectin from *Sclerotium rolfsii* impart resistance to sucking and chewing type insects in cotton. *Journal of biotechnology* 278, 20-27.
- Vassallo CN, Figueroa Bunge F, Signorini AM, Valverde-Garcia P, Rule D and Babcock J, 2019. Monitoring the evolution of resistance in *Spodoptera frugiperda* (Lepidoptera: Noctuidae) to the Cry1F protein in Argentina. *Journal of Economic Entomology* 112, 1838-1844.
- Visweshwar R, Akbar SMD, Sharma HC and Sreeramulu K, 2018. Influence of *Bacillus thuringiensis* toxins on the development and midgut proteases in different larval instars of *Helicoverpa armigera*. *Indian Journal of Entomology* 80, 960-970.
- Walsh T, James B, Chakroun M, Ferre J and Downes S, 2018. Isolating, characterising and identifying a Cry1Ac resistance mutation in field populations of *Helicoverpa punctigera*. *Scientific Reports* 8, 2626.
- Wang D, Yang X, Li H, Wuwaishi A, Ding R, Li H, Pan H, Liu J, Xu Y and Lu Y, 2018. Genetic homogeneity between populations of cotton bollworm from Xinjiang, China. *Journal of Asia-Pacific Entomology* 21, 309-315.
- Wang G, Dong Y, Liu X, Yao G, Yu X and Yang M, 2018. The current status and development of insect-resistant genetically engineered poplar in China. *Frontiers in Plant Science* 9, 1408.
- Wang G and Fok M, 2018. Managing pests after 15 years of Bt cotton: farmers' practices, performance and opinions in northern China. *Crop Protection* 110, 251-260.
- Wang L, Ma Y, Wan P, Liu K, Xiao Y, Wang J, Cong S, Xu D, Wu K, Fabrick JA, Li X and Tabashnik BE, 2018. Resistance to *Bacillus thuringiensis* linked with a cadherin transmembrane mutation affecting cellular trafficking in pink bollworm from China. *Insect Biochemistry and Molecular Biology* 94, 28-35.
- Wang Y, Li D, Zhou H, Liu H, Niu L, Wang L and Ma W, 2018. Evaluation of Cry1Ac and Cry2Aa toxin binding to two important beneficial cotton field insects, *Harmonia axyridis* and *Orius similis*. *Journal of Agricultural and Food Chemistry* 66, 8698-8702.
- Wang Y, Wang M, Xiang S, Liu Q, Qiang S and Song X, 2018. Analysis on the event of global herbicide tolerant transgenic crops. *Journal of Agricultural Biotechnology* 26, 167-175.
- Wang B, Fan C, Yin J, Wu F, Wang D and Song X, 2019. Effects of planting transgenic insect-resistant maize with cry1Ac gene Bt-799 on the composition structure of soil fauna. *Journal of Plant Protection* 46, 167-174.
- Wang B, Wang Y, Wei J, Liu C, Chen L, Khaing M and Liang G, 2019. Polycalin is involved in the action mechanism of Cry2Aa toxin in *Helicoverpa armigera* (Hubner). *Journal of Integrative Agriculture* 18, 627-635.
- Wang J, Zhang J, Guo Y, Chen L, Wang F, Huang M, Gao S and Wang R, 2019. Molecular cloning, characterization, and expression profiling analysis of Cry toxin receptor genes from sugarcane shoot borer *Chilo infuscatellus* (Snellen). *Pesticide Biochemistry and Physiology* 157, 186-195.
- Wang L, Ma Y, Guo X, Wan P, Liu K, Cong S, Wang J, Xu D, Xiao Y, Li X, Tabashnik BE and Wu K, 2019. Pink bollworm resistance to Bt toxin Cry1Ac associated with an insertion in cadherin exon 20. *Toxins* 11, 186.
- Wang L, Wang J, Ma Y, Wan P, Liu K, Cong S, Xiao Y, Xu D, Wu K, Fabrick JA, Li X

- and Tabashnik BE, 2019. Transposon insertion causes cadherin mis-splicing and confers resistance to Bt cotton in pink bollworm from China. *Scientific Reports* 9, 7479.
- Wang P, Ma J, Head GP, Xia D, Li J, Wang H, Yang M, Xie Z, Zalucki MP and Lu Z, 2019. Susceptibility of *Helicoverpa armigera* to two Bt toxins, Cry1Ac and Cry2Ab, in northwestern China: toward developing an IRM strategy. *Journal of Pest Science* 92, 923-931.
- Wei J, Yang S, Chen L, Liu X, Du M, An S and Liang G, 2018. Transcriptomic responses to different Cry1Ac selection stresses in *Helicoverpa armigera*. *Frontiers in Physiology* 9, 1653.
- Wei J, Zhang L, Yang S, Xie B, An S and Liang G, 2018. Assessment of the lethal and sublethal effects by spinetoram on cotton bollworm. *Plos One* 13, e0204154.
- Wei J, Zhang M, Liang G and Li X, 2019. Alkaline phosphatase 2 is a functional receptor of Cry1Ac but not Cry2Ab in *Helicoverpa zea*. *Insect Molecular Biology* 28, 372-379.
- Wu AJ, Chapman K, Sathischandra S, Massengill J, Araujo R, Soria M, Bugas M, Bishop Z, Haas C, Holliday B, Cisneros K, Lor J, Canez C, New S, Mackie S, Ghoshal D, Privalle L, Hunst P and Pallett K, 2019. GHB614 * T304-40 * GHB119 * COT102 cotton: protein expression analyses of field-grown samples. *Journal of Agricultural and Food Chemistry* 67, 275-281.
- Xie X, Cui Z, Wang Y, Wang Y, Cao F, Romeis J, Peng Y and Li Y, 2019. *Bacillus thuringiensis* maize expressing a fusion gene Cry1Ab/Cry1AcZM does not harm valued pollen feeders. *Toxins* 11, 8.
- Yang F, Morsello S, Head GP, Sansone C, Huang F, Gilreath RT and Kerns DL, 2018. F2 screen, inheritance and cross-resistance of field-derived Vip3A resistance in *Spodoptera frugiperda* (Lepidoptera: Noctuidae) collected from Louisiana, USA. *Pest Management Science* 74, 1769-1778.
- Yang J, Quan Y, Sivaprasath P, Shabbir MZ, Wang Z, Ferre J and He K, 2018. Insecticidal activity and synergistic combinations of ten different Bt toxins against *Mythimna separata* (Walker). *Toxins* 10, 454.
- Yang Y, Liang C, Meng Z, Chen Q, Luo S, Zhang R and Guo S, 2018. Construction of insect and herbicide resistant expression vector based on GR79 EPSPS screening marker and identification of resistance. *Journal of Agricultural Science and Technology (Beijing)* 20, 22-28.
- Yang F, Gonzalez JCS, Williams J, Cook DC, Gilreath RT and Kerns DL, 2019. Occurrence and ear damage of *Helicoverpa zea* on transgenic *Bacillus thuringiensis* maize in the field in Texas, U.S. and its susceptibility to Vip3A protein. *Toxins* 11, 102.
- Zanga D, Sanahuja G, Eizaguirre M, Albajes R, Christou P, Capell T, Fraser P, Gerrisch C and Lopez C, 2018. Carotenoids moderate the effectiveness of a Bt gene against the European corn borer, *Ostrinia nubilalis*. *Plos One* 13, e0199317.
- Zhang W, Lu Y, Werf Wvd, Huang J, Wu F, Zhou K, Deng X, Jiang Y, Wu K and Rosegrant MW, 2018. Multidecadal, county-level analysis of the effects of land use, Bt cotton, and weather on cotton pests in China. *Proceedings of the National Academy of Sciences of the United States of America* 115, E7700-E7709.
- Zhang X, Gao T, Peng Q, Song L, Zhang J, Chai Y, Sun D and Song F, 2018. A strong promoter of a non-cry gene directs expression of the cry1Ac gene in *Bacillus thuringiensis*. *Applied Microbiology and Biotechnology* 102, 3687-3699.
- Zhang X, Rui Q, Liang P, Wei C, Deng G, Chen Y, Chen Y, Dong Z and Chen D, 2018. Dynamics of Bt cotton Cry1Ac protein content under an alternating high

- temperature regime and effects on nitrogen metabolism. *Journal of Integrative Agriculture* 17, 1991-1998.
- Zhang D, Xiao Y, Chen W, Lu Y and Wu K, 2019. Field monitoring of *Helicoverpa armigera* (Lepidoptera: Noctuidae) Cry1Ac insecticidal protein resistance in China (2005-2017). *Pest Management Science* 75, 753-759.
- Zhang M, Feng M, Xiao L, Song X, Ding G and Yang W, 2019. Persistence of Cry1Ac protein from transgenic Bt cotton cultivation and residue returning in fields and its effect on functional diversity of soil microbial communities. *Pedosphere* 29, 114-122.
- Zhang M, Wei J, Ni X, Zhang J, Jurat-Fuentes JL, Fabrick JA, Carriere Y, Tabashnik BE and Li X, 2019. Decreased Cry1Ac activation by midgut proteases associated with Cry1Ac resistance in *Helicoverpa zea*. *Pest Management Science* 75, 1099-1106.
- Zhao M, Li Y, Yuan X, Liang G, Wang B, Liu C and Myint Myint K, 2018. Establishment of a dietary exposure assay for evaluating the toxicity of insecticidal compounds to *Apolygus lucorum* (Hemiptera: Miridae). *Environmental Pollution* 237, 414-423.
- Zhong J, Hu X, Zhang X, Liu Y, Xu C, Zhang C, Lin M and Liu X, 2018. Broad specificity immunoassay for detection of *Bacillus thuringiensis* Cry toxins through engineering of a single chain variable fragment with mutagenesis and screening. *International Journal of Biological Macromolecules* 107, 920-928.
- Zhu C, Niu Y, Zhou Y, Guo J, Head GP, Price PA, Wen X and Huang F, 2019. Survival and effective dominance level of a Cry1A.105/Cry2Ab2-dual gene resistant population of *Spodoptera frugiperda* (J.E. Smith) on common pyramided Bt corn traits. *Crop Protection* 115, 84-91.
- Zia MA, Shinwari ZK, Ali S, Shah SH, Anwar M and Ali GM, 2018. Comparison among different cotton (*Gossypium hirsutum* L.) genotypes with respect to morphological, fibre quality attributes and expression analysis of Cry1Ac gene. *JAPS, Journal of Animal and Plant Sciences* 28, 819-829.

3. Entries retrieved using MEDLINE

- Abdelgaffar H, Tague ED, Castro Gonzalez HF, Campagna SR and Jurat-Fuentes JL, 2019. Midgut metabolomic profiling of fall armyworm (*Spodoptera frugiperda*) with field-evolved resistance to Cry1F corn. *Insect Biochemistry and Molecular Biology* 106, 1-9.
- Abdelgaffar HM, Oppert C, Sun X, Monserrate J and Jurat-Fuentes JL, 2019. Differential heliothine susceptibility to Cry1Ac associated with gut proteolytic activity. *Pesticide Biochemistry and Physiology* 153, 1-8.
- Ahmad S, Cheema HMN, Khan AA, Khan RSA and Ahmad JN, 2019. Resistance status of *Helicoverpa armigera* against Bt cotton in Pakistan. *Transgenic Research* 28, 199-212.
- Ali I, Zhang S, Muhammad MS, Iqbal M and Cui JJJ, 2018. Bt Proteins Have No Detrimental Effects on Larvae of the Green Lacewing, *Chrysopa pallens* (Rambur) (Neuroptera: Chrysopidae). *Neotropical Entomology* 47, 336-343.
- Bakhsh A, Dinc T, Hussain T, Demirel U, Aasim M and Caliskan ME, 2018. Development of transgenic tobacco lines with pyramided insect resistant genes. *Turkish journal of biology = Turk biyoloji dergisi* 42, 174-186.
- Bel Y, Zack M, Narva K and Escriche B, 2019. Specific binding of *Bacillus thuringiensis* Cry1Ea toxin, and Cry1Ac and Cry1Fa competition analyses in *Anticarsia gemmatilis* and *Chrysodeixis includens*. *Scientific Reports* 9, 18201.
- Bengyella L, Yekwa EL, Iftikhar S, Nawaz K, Jose RC, Fonmboh DJ, Tambo E and Roy P,

2018. Global challenges faced by engineered *Bacillus thuringiensis* Cry genes in soybean (*Glycine max* L.) in the twenty-first century. *3 Biotech* 8, 464.
- Bilbo TR, Reay-Jones FPF, Reisig DD, Musser FR and Greene JK, 2018. Effects of Bt Corn on the Development and Fecundity of Corn Earworm (Lepidoptera: Noctuidae). *Journal of Economic Entomology* 111, 2233-2241.
- Bilbo TR, Reay-Jones FPF, Reisig DD and Greene JK, 2019. Susceptibility of Corn Earworm (Lepidoptera: Noctuidae) to Cry1A.105 and Cry2Ab2 in North and South Carolina. *Journal of Economic Entomology* 112, 1845-1857.
- Bilbo TR, Reay-Jones FPF, Reisig DD, Greene JK and Turnbull MW, 2019. Development, survival, and feeding behavior of *Helicoverpa zea* (Lepidoptera: Noctuidae) relative to Bt protein concentrations in corn ear tissues. *Plos One* 14, e0221343.
- Bird LJ, 2018. Pyrethroid and carbamate resistance in Australian *Helicoverpa armigera* (Lepidoptera: Noctuidae) from 2008 to 2015: what has changed since the introduction of Bt cotton? *Bulletin of Entomological Research* 108, 781-791.
- Boaventura D, Ulrich J, Lueke B, Bolzan A, Okuma D, Gutbrod O, Geibel S, Zeng Q, Dourado PM, Martinelli S, Flagel L, Head G and Nauen R, 2019. Molecular characterization of Cry1F resistance in fall armyworm, *Spodoptera frugiperda* from Brazil. *Insect Biochemistry and Molecular Biology* 116, 103280.
- Boddupally D, Tamirisa S, Gundra SR, Vudem DR and Khareedu VR, 2018. Expression of hybrid fusion protein (Cry1Ac::ASAL) in transgenic rice plants imparts resistance against multiple insect pests. *Scientific Reports* 8, 8458.
- Boonchaisri S, Rochfort S, Stevenson T and Dias DA, 2019. Recent developments in metabolomics-based research in understanding transgenic grass metabolism. *Metabolomics : Official journal of the Metabolomic Society* 15, 47.
- Botha AS, Erasmus A, du Plessis H and Van den Berg J, 2019. Efficacy of Bt Maize for Control of *Spodoptera frugiperda* (Lepidoptera: Noctuidae) in South Africa. *Journal of Economic Entomology* 112, 1260-1266.
- Braswell LR, Reisig DD, Sorenson CE and Collins GD, 2019. *Helicoverpa zea* (Lepidoptera: Noctuidae) Preference for Plant Structures, and Their Location, Within Bt Cotton Under Different Nitrogen and Irrigation Regimes. *Journal of Economic Entomology* 112, 1741-1751.
- Braswell LR, Reisig DD, Sorenson CE and Collins GD, 2019. *Helicoverpa zea* (Lepidoptera: Noctuidae) Oviposition and Larval Vertical Distribution in Bt Cotton Under Different Levels of Nitrogen and Irrigation. *Journal of Economic Entomology* 112, 1237-1250.
- Caprio MA, Kurtz R, Catchot A, Kerns D, Reisig D, Gore J and Reay-Jones FPF, 2019. The Corn-Cotton Agroecosystem in the Mid-Southern United States: What Insecticidal Event Pyramids Should be Used in Each Crop to Extend Vip3A Durability. *Journal of Economic Entomology* 112, 2894-2906.
- Carriere Y, Degain BA, Unnithan GC, Harpold VS, Heuberger S, Li X and Tabashnik BE, 2018. Effects of seasonal changes in cotton plants on the evolution of resistance to pyramided cotton producing the Bt toxins Cry1Ac and Cry1F in *Helicoverpa zea*. *Pest Management Science* 74, 627-637.
- Carriere Y, Williams JL, Crowder DW and Tabashnik BE, 2018. Genotype-specific fitness cost of resistance to Bt toxin Cry1Ac in pink bollworm. *Pest Management Science* 74, 2496-2503.
- Carriere Y, Degain B, Unnithan GC, Harpold VS, Li X and Tabashnik BE, 2019. Seasonal Declines in Cry1Ac and Cry2Ab Concentration in Maturing Cotton Favor Faster Evolution of Resistance to Pyramided Bt Cotton in *Helicoverpa zea* (Lepidoptera:

- Noctuidae). *Journal of Economic Entomology* 112, 2907-2914.
- Chandrasena DI, Signorini AM, Abratti G, Storer NP, Olaciregui ML, Alves AP and Pilcher CD, 2018. Characterization of field-evolved resistance to *Bacillus thuringiensis*-derived Cry1F delta-endotoxin in *Spodoptera frugiperda* populations from Argentina. *Pest Management Science* 74, 746-754.
- Chen W, Liu C, Lu G, Cheng H, Shen Z and Wu K, 2018. Effects of Vip3AcAa+Cry1Ac Cotton on Midgut Tissue in *Helicoverpa armigera* (Lepidoptera: Noctuidae). *Journal of insect science* (Online) 18.
- Chen X, Gao T, Peng Q, Zhang J, Chai Y and Song F, 2018. Novel Cell Wall Hydrolase CwIC from *Bacillus thuringiensis* Is Essential for Mother Cell Lysis. *Applied and Environmental Microbiology* 84.
- Chen Y, Li Y, Zhou M, Cai Z, Tambel LIM, Zhang X, Chen Y and Chen D, 2019. Nitrogen deficit decreases seed Cry1Ac endotoxin expression in Bt transgenic cotton. *Plant physiology and biochemistry : PPB* 141, 114-121.
- Da Silva IHS, Gomez I, Sanchez J, Martinez de Castro DL, Valicente FH, Soberon M, Polanczyk RA and Bravo A, 2018. Identification of midgut membrane proteins from different instars of *Helicoverpa armigera* (Lepidoptera: Noctuidae) that bind to Cry1Ac toxin. *Plos One* 13, e0207789.
- da Silva G, Costa Ramos LF, Dos Santos Seckler H, Mendonca Gomes F, Reis Cortines J, Ramos I, Dinis Anobom C, de Alcantara Machado E and Perpetua de Oliveira DM, 2019. Biochemical characterization of digestive membrane-associated alkaline phosphatase from the velvet bean caterpillar *Anticarsia gemmatilis*. *Archives of Insect Biochemistry and Physiology* 102, e21591.
- Dandan Z, Yutao X, Wenbo C, Yanhui L and Kongming W, 2019. Field monitoring of *Helicoverpa armigera* (Lepidoptera: Noctuidae) Cry1Ac insecticidal protein resistance in China (2005-2017). *Pest Management Science* 75, 753-759.
- Deng J, Wang Y, Yang F, Liu Y and Liu B, 2019. Persistence of insecticidal Cry toxins in Bt rice residues under field conditions estimated by biological and immunological assays. *The Science of the total environment* 679, 45-51.
- Dhanaraj AL, Willse AR and Kamath SP, 2019. Stability of expression of Cry1Ac and Cry2Ab2 proteins in Bollgard-II hybrids at different stages of crop growth in different genotypes across cropping seasons and multiple geographies. *Transgenic Research* 28, 33-50.
- Ding R, Ma D, Uwais A, Wang D, Liu J, Xu Y, Li H, Li H and Pan H, 2019. Transgenic Cry1Ac cotton does not affect the development and fecundity of *Chrysoperla carnea*. *Plos One* 14, e0214668.
- Dominguez-Mendez R, Alcantara-de la Cruz R, Rojano-Delgado AM, da Silveira HM, Portugal J, Cruz-Hipolito HE and De Prado R, 2019. Stacked traits conferring multiple resistance to imazamox and glufosinate in soft wheat. *Pest Management Science* 75, 648-657.
- Dong S, Liu Y, Zhang X, Xu C, Liu X and Zhang C, 2019. Development of an immunochromatographic assay for the specific detection of *Bacillus thuringiensis* (Bt) Cry1Ab toxin. *Analytical biochemistry* 567, 1-7.
- Eisenring M, Naranjo SE, Bacher S, Abbott A, Meissle M and Romeis J, 2019. Reduced caterpillar damage can benefit plant bugs in Bt cotton. *Scientific Reports* 9, 2727.
- Eski A, Demir I, Gullu M and Demirbag Z, 2018. Biodiversity and pathogenicity of bacteria associated with the gut microbiota of beet armyworm, *Spodoptera exigua* Hubner (Lepidoptera: Noctuidae). *Microbial Pathogenesis* 121, 350-358.
- Fabrick JA, Mathew LG, LeRoy DM, Hull JJ, Unnithan GC, Yelich AJ, Carriere Y, Li X

- and Tabashnik BE, 2020. Reduced cadherin expression associated with resistance to Bt toxin Cry1Ac in pink bollworm. *Pest Management Science* 76, 67-74.
- Fernandes MG, Costa EN, Dutra CC and Raizer J, 2019. Species Richness and Community Composition of Ants and Beetles in Bt and non-Bt Maize Fields. *Environmental Entomology* 48, 1095-1103.
- Fleming D, Musser F, Reisig D, Greene J, Taylor S, Parajulee M, Lorenz G, Catchot A, Gore J, Kerns D, Stewart S, Boykin D, Caprio M and Little N, 2018. Effects of transgenic *Bacillus thuringiensis* cotton on insecticide use, heliothine counts, plant damage, and cotton yield: A meta-analysis, 1996-2015. *Plos One* 13, e0200131.
- Fritz ML, DeYonke AM, Papanicolaou A, Micinski S, Westbrook J and Gould F, 2018. Contemporary evolution of a Lepidopteran species, *Heliothis virescens*, in response to modern agricultural practices. *Molecular Ecology* 27, 167-181.
- G Montezano D, Hunt TE, Specht A, C Luz PM and Peterson JA, 2019. Survival and Development of *Striacosta albicosta* (Smith) (Lepidoptera: Noctuidae) Immature Stages on Dry Beans, non-Bt, Cry1F, and Vip3A Maize. *Insects* 10.
- Gao M, Wang X, Yang Y, Tabashnik BE and Wu Y, 2018. Epistasis confers resistance to Bt toxin Cry1Ac in the cotton bollworm. *Evolutionary Applications* 11, 809-819.
- Gao M, Dong S, Hu X, Zhang X, Liu Y, Zhong J, Lu L, Wang Y, Chen L and Liu X, 2019. Roles of Midgut Cadherin from Two Moths in Different *Bacillus thuringiensis* Action Mechanisms: Correlation among Toxin Binding, Cellular Toxicity, and Synergism. *Journal of Agricultural and Food Chemistry* 67, 13237-13246.
- Garcia-Gomez BI, Cano SN, Zagal EE, Dantan-Gonzalez E, Bravo A and Soberon M, 2019. Insect Hsp90 Chaperone Assists *Bacillus thuringiensis* Cry Toxicity by Enhancing Protoxin Binding to the Receptor and by Protecting Protoxin from Gut Protease Degradation. *mBio* 10.
- Gartia J, Barnwal RP, Anangi R, Giri AR, King G and Chary KVR, 2019. 1H, 13C and 15N NMR assignments of two plant protease inhibitors (IRD7 and IRD12) from the plant *Capsicum annuum*. *Biomolecular NMR assignments* 13, 31-35.
- Grimi DA, Parody B, Ramos ML, Machado M, Ocampo F, Willse A, Martinelli S and Head G, 2018. Field-evolved resistance to Bt maize in sugarcane borer (*Diatraea saccharalis*) in Argentina. *Pest Management Science* 74, 905-913.
- Guan R, Chen Q, Li H, Hu S, Miao X, Wang G and Yang B, 2019. Knockout of the HaREase Gene Improves the Stability of dsRNA and Increases the Sensitivity of *Helicoverpa armigera* to *Bacillus thuringiensis* Toxin. *Frontiers in Physiology* 10, 1368.
- Guo W, Kain W and Wang P, 2019. Effects of disruption of the peritrophic membrane on larval susceptibility to Bt toxin Cry1Ac in cabbage loopers. *Journal of insect physiology* 117, 103897.
- Guo Z, Sun D, Kang S, Zhou J, Gong L, Qin J, Guo L, Zhu L, Bai Y, Luo L and Zhang Y, 2019. CRISPR/Cas9-mediated knockout of both the PxABCC2 and PxABCC3 genes confers high-level resistance to *Bacillus thuringiensis* Cry1Ac toxin in the diamondback moth, *Plutella xylostella* (L.). *Insect Biochemistry and Molecular Biology* 107, 31-38.
- Han C, Liu B and Zhong W, 2018. Effects of transgenic Bt rice on the active rhizospheric methanogenic archaeal community as revealed by DNA-based stable isotope probing. *Journal of applied microbiology* 125, 1094-1107.
- Herman RA, Ekmay RD, Schafer BW, Song P, Fast BJ, Papineni S, Shan G and Juberg DR, 2018. Food and feed safety of DAS-444O6-6 herbicide-tolerant soybean. *Regulatory toxicology and pharmacology : RTP* 94, 70-74.

- Hu Q, Min L, Yang X, Jin S, Zhang L, Li Y, Ma Y, Qi X, Li D, Liu H, Lindsey K, Zhu L and Zhang X, 2018. Laccase GhLac1 Modulates Broad-Spectrum Biotic Stress Tolerance via Manipulating Phenylpropanoid Pathway and Jasmonic Acid Synthesis. *Plant physiology* 176, 1808-1823.
- Hu X, Zhang X, Zhong J, Liu Y, Zhang C, Xie Y, Lin M, Xu C, Lu L, Zhu Q and Liu X, 2018. Expression of Cry1Ac toxin-binding region in *Plutella xylostella* cadherin-like receptor and studying their interaction mode by molecular docking and site-directed mutagenesis. *International Journal of Biological Macromolecules* 111, 822-831.
- Huang C-W, Chen W-J, Ke X, Li Y and Luan Y-X, 2019. A multi-generational risk assessment of Cry1F on the non-target soil organism *Folsomia candida* (Collembola) based on whole transcriptome profiling. *Peerj* 7, e6924.
- Ingber DA, Mason CE and Flexner L, 2018. Cry1 Bt Susceptibilities of Fall Armyworm (Lepidoptera: Noctuidae) Host Strains. *Journal of Economic Entomology* 111, 361-368.
- Jerga A, Evdokimov AG, Moshiri F, Haas JA, Chen M, Clinton W, Fu X, Halls C, Jimenez-Juarez N, Kretzler CN, Panosian TD, Pleau M, Roberts JK, Rydel TJ, Salvador S, Sequeira R, Wang Y, Zheng M and Baum JA, 2019. Disabled insecticidal proteins: A novel tool to understand differences in insect receptor utilization. *Insect Biochemistry and Molecular Biology* 105, 79-88.
- Jin L, Wang J, Guan F, Zhang J, Yu S, Liu S, Xue Y, Li L, Wu S, Wang X, Yang Y, Abdelgaffar H, Jurat-Fuentes JL, Tabashnik BE and Wu Y, 2018. Dominant point mutation in a tetraspanin gene associated with field-evolved resistance of cotton bollworm to transgenic Bt cotton. *Proceedings of the National Academy of Sciences of the United States of America* 115, 11760-11765.
- Jin M, Liao C, Chakrabarty S, Wu K and Xiao Y, 2019. Comparative Proteomics of Peritrophic Matrix Provides an Insight into its Role in Cry1Ac Resistance of Cotton Bollworm *Helicoverpa armigera*. *Toxins* 11.
- Jin M-H, Xiao Y-T, Cheng Y, Hu J, Xue C-B and Wu K-M, 2019. Chromosomal deletions mediated by CRISPR/Cas9 in *Helicoverpa armigera*. *Insect Science* 26, 1029-1036.
- Kahn TW, Chakraborty M, Williams J, Walsh T, James B, Monserrate J and Ferre J, 2018. Efficacy and Resistance Management Potential of a Modified Vip3C Protein for Control of *Spodoptera frugiperda* in Maize. *Scientific Reports* 8, 16204.
- Kaur G, Guo J, Brown S, Head GP, Price PA, Paula-Moraes S, Ni X, Dimase M and Huang F, 2019. Field-evolved resistance of *Helicoverpa zea* (Boddie) to transgenic maize expressing pyramided Cry1A.105/Cry2Ab2 proteins in northeast Louisiana, the United States. *Journal of Invertebrate Pathology* 163, 11-20.
- Leite NA, Pereira RM, Durigan MR, Amado D, Fatoletto J, Medeiros FCL and Omoto C, 2018. Susceptibility of Brazilian Populations of *Helicoverpa armigera* and *Helicoverpa zea* (Lepidoptera: Noctuidae) to Vip3Aa20. *Journal of Economic Entomology* 111, 399-404.
- Levine SL, Fridley JM and Uffman JP, 2019. Assessing the Potential for Interaction in Insecticidal Activity Between MON 87751 * MON 87701 Produced by Conventional Breeding. *Environmental Entomology* 48, 1241-1248.
- Li P, Li Y, Shi J, Yu Z, Pan A, Tang X and Ming F, 2018. Impact of transgenic Cry1Ac + CptI cotton on diversity and dynamics of rhizosphere bacterial community of different root environments. *The Science of the total environment* 637-638, 233-243.
- Li S, Wang Z, Zhou Y, Li C, Wang G, Wang H, Zhang J, Liang G and Lang Z, 2018.

- Expression of cry2Ah1 and two domain II mutants in transgenic tobacco confers high resistance to susceptible and Cry1Ac-resistant cotton bollworm. *Scientific Reports* 8, 508.
- Li X, Zhao F, Qiu X, Ren X, Mo X, Ding X, Xia L and Sun Y, 2018. The full-length Cry1Ac protoxin without proteolytic activation exhibits toxicity against insect cell line CF-203. *Journal of Invertebrate Pathology* 152, 25-29.
- Li R, Yang S, Qiu X, Lu X, Hu Q, Ren X, Wu B, Qi L, Ding X, Xia L and Sun Y, 2019. The conserved cysteine residues in *Bacillus thuringiensis* Cry1Ac protoxin are not essential for the bipyrimal crystal formation. *Journal of Invertebrate Pathology* 163, 82-85.
- Li S, Hussain F, Unnithan GC, Dong S, UlAbdin Z, Gu S, Mathew LG, Fabrick JA, Ni X, Carriere Y, Tabashnik BE and Li X, 2019. A long non-coding RNA regulates cadherin transcription and susceptibility to Bt toxin Cry1Ac in pink bollworm, *Pectinophora gossypiella*. *Pesticide Biochemistry and Physiology* 158, 54-60.
- Li X, Ouyang X, Zhang Z, He L, Wang Y, Li Y, Zhao J, Chen Z, Wang C, Ding L, Pei Y and Xiao Y, 2019. Over-expression of the red plant gene R1 enhances anthocyanin production and resistance to bollworm and spider mite in cotton. *Molecular genetics and genomics* : MGG 294, 469-478.
- Li Y, Hallerman EM, Wu K and Peng Y, 2019. Insect-Resistant Genetically Engineered Crops in China: Development, Application, and Prospects for Use. *Annual review of entomology*.
- Lin P, Cheng T, Feng T, Gong J, Liu C and Xia Q, 2018. Interaction of *Bombyx mori* aminopeptidase N and cadherin-like protein with *Bacillus thuringiensis* Cry1Ac toxin. *Sheng wu gong cheng xue bao = Chinese journal of biotechnology* 34, 1809-1822.
- Little NS, Elkins BH, Mullen RM, Perera OP, Parys KA, Allen KC and Boykin DL, 2019. Differences between two populations of bollworm, *Helicoverpa zea* (Lepidoptera: Noctuidae), with variable measurements of laboratory susceptibilities to Bt toxins exposed to non-Bt and Bt cottons in large field cages. *Plos One* 14, e0212567.
- Liu L, Chen Z, Yang Y, Xiao Y, Liu C, Ma Y, Soberon M, Bravo A, Yang Y and Liu K, 2018. A single amino acid polymorphism in ABCC2 loop 1 is responsible for differential toxicity of *Bacillus thuringiensis* Cry1Ac toxin in different *Spodoptera* (Noctuidae) species. *Insect Biochemistry and Molecular Biology* 100, 59-65.
- Liu M, Huang R, Weisman A, Yu X, Lee S-H, Chen Y, Huang C, Hu S, Chen X, Tan W, Liu F, Chen H and Shea KJ, 2018. Synthetic Polymer Affinity Ligand for *Bacillus thuringiensis* (Bt) Cry1Ab/Ac Protein: The Use of Biomimicry Based on the Bt Protein-Insect Receptor Binding Mechanism. *Journal of the American Chemical Society* 140, 6853-6864.
- Liu M-M, Zhang X-J, Gao Y, Shen Z-C and Lin C-Y, 2018. Molecular characterization and efficacy evaluation of a transgenic corn event for insect resistance and glyphosate tolerance. *Journal of Zhejiang University Science B* 19, 610-619.
- Liu T, Chen X, Qi L, Chen F, Liu M and Whalen JK, 2018. Root and detritus of transgenic Bt crop did not change nematode abundance and community composition but enhanced trophic connections. *The Science of the total environment* 644, 822-829.
- Liu A, Huang X, Gong L, Guo Z, Zhang Y and Yang Z, 2019. Characterization of immune-related PGRP gene expression and phenoloxidase activity in Cry1Ac-susceptible and -resistant *Plutella xylostella* (L.). *Pesticide Biochemistry and Physiology* 160, 79-86.
- Liu J, NanGong Z, Zhang J, Song P, Tang Y, Gao Y and Wang Q, 2019. Expression and

- characterization of two chitinases with synergistic effect and antifungal activity from *Xenorhabdus nematophila*. *World journal of microbiology & biotechnology* 35, 106.
- Liu J, Wang L, Zhou G, Gao S, Sun T, Liu J and Gao B, 2019. Midgut transcriptome analysis of *Clostera anachoretatreated* with lethal and sublethal Cry1Ac protoxin. *Archives of Insect Biochemistry and Physiology* e21638.
- Liu Z, Zhu Z and Zhang T, 2019. Development of Transgenic CryIA(c) + GNA Cotton Plants via Pollen-Tube Pathway Method Confers Resistance to *Helicoverpa armigera* and *Aphis gossypii* Glover. *Methods in molecular biology* (Clifton, NJ) 1902, 233-244.
- Lu X, Jiang D-J, Yan J-X, Ma Z-E, Luo X-E, Wei T-L, Xu Y and He Q-H, 2018. An ultrasensitive electrochemical immunosensor for Cry1Ab based on phage displayed peptides. *Talanta* 179, 646-651.
- Lv J, Zhang X, Gao T, Cui T, Peng Q, Zhang J and Song F, 2019. Effect of the spoIIID mutation on mother cell lysis in *Bacillus thuringiensis*. *Applied Microbiology and Biotechnology* 103, 4103-4112.
- Ma W and Zhang T, 2019. Next-Generation Transgenic Cotton: Pyramiding RNAi with Bt Counters Insect Resistance. *Methods in molecular biology* (Clifton, NJ) 1902, 245-256.
- Ma Y, Zhang J, Xiao Y, Yang Y, Liu C, Peng R, Yang Y, Bravo A, Soberon M and Liu K, 2019. The Cadherin Cry1Ac Binding-Region is Necessary for the Cooperative Effect with ABCC2 Transporter Enhancing Insecticidal Activity of *Bacillus thuringiensis* Cry1Ac Toxin. *Toxins* 11.
- Marques LH, Santos AC, Castro BA, Storer NP, Babcock JM, Lepping MD, Sa V, Moscardini VF, Rule DM and Fernandes OA, 2018. Impact of transgenic soybean expressing Cry1Ac and Cry1F proteins on the non-target arthropod community associated with soybean in Brazil. *Plos One* 13, e0191567.
- Marques LH, Santos AC, Castro BA, Moscardini VF, Rosseto J, Silva OABN and Babcock JM, 2019. Assessing the Efficacy of *Bacillus thuringiensis* (Bt) Pyramided Proteins Cry1F, Cry1A.105, Cry2Ab2, and Vip3Aa20 Expressed in Bt Maize Against Lepidopteran Pests in Brazil. *Journal of Economic Entomology* 112, 803-811.
- Martinez-Solis M, Pinos D, Endo H, Portugal L, Sato R, Ferre J, Herrero S and Hernandez-Martinez P, 2018. Role of *Bacillus thuringiensis* Cry1A toxins domains in the binding to the ABCC2 receptor from *Spodoptera exigua*. *Insect Biochemistry and Molecular Biology* 101, 47-56.
- Mathew LG, Ponnuraj J, Mallappa B, Chowdary LR, Zhang J, Tay WT, Walsh TK, Gordon KHJ, Heckel DG, Downes S, Carriere Y, Li X, Tabashnik BE and Fabrick JA, 2018. ABC transporter mis-splicing associated with resistance to Bt toxin Cry2Ab in laboratory- and field-selected pink bollworm. *Scientific Reports* 8, 13531.
- McGale E, Diezel C, Schuman MC and Baldwin IT, 2018. Cry1Ac production is costly for native plants attacked by non-Cry1Ac-targeted herbivores in the field. *The New phytologist* 219, 714-727.
- Meissle M and Romeis J, 2018. Transfer of Cry1Ac and Cry2Ab proteins from genetically engineered Bt cotton to herbivores and predators. *Insect Science* 25, 823-832.
- Mendoza-Almanza G, Rocha-Zavaleta L, Aguilar-Zacarias C, Ayala-Lujan J and Olmos J, 2019. Cry1A Proteins are Cytotoxic to HeLa but not to SiHa Cervical Cancer Cells. *Current pharmaceutical biotechnology* 20, 1018-1027.
- Miao S, Yuan X, Liang Y, Wang H, Leng L, Wu Z, Jiang L, Li Y, Mo D and Zeng G, 2018. In situ surface transfer process of Cry1Ac protein on SiO₂ : The effect of

- biosurfactants for desorption. *Journal of hazardous materials* 341, 150-158.
- Murua MG, Vera MA, Herrero MI, Fogliata SV and Michel A, 2018. Defoliation of Soybean Expressing Cry1Ac by Lepidopteran Pests. *Insects* 9.
- Mushtaq R, Shakoori AR and Jurat-Fuentes JL, 2018. Domain III of Cry1Ac Is Critical to Binding and Toxicity against Soybean Looper (*Chrysodeixis includens*) but Not to Velvetbean Caterpillar (*Anticarsia gemmatilis*). *Toxins* 10.
- Myint Khaing M, Yang X, Zhao M, Zhang W, Wang B, Wei J and Liang G, 2018. Effects of antibiotics on biological activity of Cry1Ac in Bt-susceptible and Bt-resistant *Helicoverpa armigera* strains. *Journal of Invertebrate Pathology* 151, 197-200.
- Naik VC, Kumbhare S, Kranthi S, Satija U and Kranthi KR, 2018. Field-evolved resistance of pink bollworm, *Pectinophora gossypiella* (Saunders) (Lepidoptera: Gelechiidae), to transgenic *Bacillus thuringiensis* (Bt) cotton expressing crystal 1Ac (Cry1Ac) and Cry2Ab in India. *Pest Management Science* 74, 2544-2554.
- Niu L, Tian Z, Liu H, Zhou H, Ma W, Lei C and Chen L, 2018. Transgenic Bt cotton expressing Cry1Ac/Cry2Ab or Cry1Ac/EPSPS does not affect the plant bug *Adelphocoris suturalis* or the pollinating beetle *Haptoncus luteolus*. *Environmental pollution (Barking, Essex : 1987)* 234, 788-793.
- Pan J, Lv X, Jin D, Bai Z, Qi H, Zhang H and Zhuang G, 2019. Developmental stage has a greater effect than Cry1Ac expression in transgenic cotton on the phyllosphere mycobiome. *Canadian journal of microbiology* 65, 116-125.
- Pandey SP, Singh AP, Srivastava S, Chandrashekar K and Sane AP, 2019. A strong early acting wound-inducible promoter, RbPCD1pro, activates cryIac expression within minutes of wounding to impart efficient protection against insects. *Plant Biotechnology Journal* 17, 1458-1470.
- Panwar BS, Kaur J, Kumar P and Kaur S, 2018. A novel cry52Ca1 gene from an Indian *Bacillus thuringiensis* isolate is toxic to *Helicoverpa armigera* (cotton boll worm). *Journal of Invertebrate Pathology* 159, 137-140.
- Papineni S, Passage JK, Ekmay RD and Thomas J, 2018. Evaluation of 30% DAS-444O6-6 soybean meal in a subchronic rat toxicity study. *Regulatory toxicology and pharmacology : RTP* 94, 57-69.
- Park D, Choi I-Y and Kim N-S, 2019. Detection of mPing mobilization in transgenic rice plants. *Genes & genomics*.
- Peng C, Chen X, Wang X, Xu X, Wei W, Wang C and Xu J, 2018. Comparative analysis of miRNA expression profiles in transgenic and non-transgenic rice using miRNA-Seq. *Scientific Reports* 8, 338.
- Pinos D, Martinez-Solis M, Herrero S, Ferre J and Hernandez-Martinez P, 2019. The *Spodoptera exigua* ABCC2 Acts as a Cry1A Receptor Independently of its Nucleotide Binding Domain II. *Toxins* 11.
- Prodhan MZH, Hasan MT, Chowdhury MMI, Alam MS, Rahman ML, Azad AK, Hossain MJ, Naranjo SE and Shelton AM, 2018. Bt eggplant (*Solanum melongena* L.) in Bangladesh: Fruit production and control of eggplant fruit and shoot borer (*Leucinodes orbonalis* Guenee), effects on non-target arthropods and economic returns. *Plos One* 13, e0205713.
- Prodhan MZH, Shirale DK, Islam MZ, Hossain MJ, Paranjape V and Shelton AM, 2019. Susceptibility of Field Populations of Eggplant Fruit and Shoot Borer (*Leucinodes orbonalis* Guenee) to Cry1Ac, the Protein Expressed in Bt Eggplant (*Solanum melongena* L.) in Bangladesh. *Insects* 10.
- Qian Z-Y, Zhang S-J, Zhang L, Zhang J, Liu Y-H, Zhou Q-H, Jiang S-Q and Li S-F, 2018. Subchronic toxicity study in rats evaluating genetically modified DAS-81419-2

- p>soybean. Regulatory toxicology and pharmacology : RTP 96, 48-56.
- Qiu L, Wang P, Wu T, Li B, Wang X, Lei C, Lin Y, Zhao J and Ma W, 2018. Downregulation of *Chilo suppressalis* alkaline phosphatase genes associated with resistance to three transgenic *Bacillus thuringiensis* rice lines. *Insect Molecular Biology* 27, 83-89.
- Qiu L, Sun Y, Jiang Z, Yang P, Liu H, Zhou H, Wang X, Zhang W, Lin Y and Ma W, 2019. The midgut V-ATPase subunit A gene is associated with toxicity to crystal 2Aa and crystal 1Ca-expressing transgenic rice in *Chilo suppressalis*. *Insect Molecular Biology* 28, 520-527.
- Qiu X, Lu X, Ren X, Li R, Wu B, Yang S, Qi L, Mo X, Ding X, Xia L and Sun Y, 2019. Solubility enhancement of Cry2Aa crystal through carboxy-terminal extension and synergism between the chimeric protein and Cry1Ac. *Applied Microbiology and Biotechnology* 103, 2243-2250.
- Rao W, Zhan Y, Chen S, Xu Z, Huang T, Hong X, Zheng Y, Pan X and Guan X, 2018. Flowerlike Mg(OH)₂ Cross-Nanosheets for Controlling Cry1Ac Protein Loss: Evaluation of Insecticidal Activity and Biosecurity. *Journal of Agricultural and Food Chemistry* 66, 3651-3657.
- Reisig DD, Huseeth AS, Bacheler JS, Aghaee M-A, Braswell L, Burrack HJ, Flanders K, Greene JK, Herbert DA, Jacobson A, Paula-Moraes SV, Roberts P and Taylor SV, 2018. Long-Term Empirical and Observational Evidence of Practical *Helicoverpa zea* Resistance to Cotton With Pyramided Bt Toxins. *Journal of Economic Entomology* 111, 1824-1833.
- Reisig DD and Kurtz R, 2018. Bt Resistance Implications for *Helicoverpa zea* (Lepidoptera: Noctuidae) Insecticide Resistance Management in the United States. *Environmental Entomology* 47, 1357-1364.
- Rendon D, Taylor PW, Wilder SM and Whitehouse MEA, 2019. Does prey encounter and nutrient content affect prey selection in wolf spiders inhabiting Bt cotton fields? *Plos One* 14, e0210296.
- Reyaz AL, Balakrishnan N and Udayasuriyan V, 2018. A new observation on feeding behaviour of pink bollworm and its application in screening Bt-resistant population. *3 Biotech* 8, 237.
- Reyaz AL, Balakrishnan N and Udayasuriyan V, 2019. Genome sequencing of *Bacillus thuringiensis* isolate T414 toxic to pink bollworm (*Pectinophora gossypiella* Saunders) and its insecticidal genes. *Microbial Pathogenesis* 134, 103553.
- Rivero-Borja M, Rodriguez-Maciel JC, Urzua Gutierrez JA, Silva-Aguayo G, Chandrasena DI, Felix-Bermudez NC and Storer NP, 2019. Baseline of Susceptibility to the Cry1F Protein in Mexican Populations of Fall Armyworm. *Journal of Economic Entomology*.
- Rodrigues-Silva N, Canuto AF, Oliveira DF, Teixeira AF, Santos-Amaya OF, Picanco MC and Pereira EJG, 2019. Negative cross-resistance between structurally different *Bacillus thuringiensis* toxins may favor resistance management of soybean looper in transgenic Bt cultivars. *Scientific Reports* 9, 199.
- Rubio-Infante N, Ilhuicatz-Alvarado D, Torres-Martinez M, Reyes-Grajeda JP, Nava-Acosta R, Gonzalez-Gonzalez E and Moreno-Fierros L, 2018. The Macrophage Activation Induced by *Bacillus thuringiensis* Cry1Ac Protoxin Involves ERK1/2 and p38 Pathways and the Interaction with Cell-Surface-HSP70. *Journal of cellular biochemistry* 119, 580-598.
- Rubio-Infante N, Ilhuicatz-Alvarado D, Torres-Martinez M, Reyes-Grajeda JP, Nava-Acosta R, Gonzalez-Gonzalez E and Moreno-Fierros L, 2018. Cover Image,

- Volume 119, Number 1, January 2018. *Journal of cellular biochemistry* 119, i.
- Rupula K, Kosuri T, Gul MZ, Sharma B and Beedu SR, 2019. Immuno-analytical method development for detection of transgenic Cry1Ac protein and its validation. *Journal of the Science of Food and Agriculture* 99, 6903-6910.
- Sahin B, Gomis-Cebolla J, Gunes H and Ferre J, 2018. Characterization of *Bacillus thuringiensis* isolates by their insecticidal activity and their production of Cry and Vip3 proteins. *Plos One* 13, e0206813.
- Salisu IB, Shahid AA, Yaqoob A, Rao AQ and Husnain T, 2019. Effect of dietary supplementation of recombinant Cry and Cp4 epsps proteins on haematological indices of growing rabbits. *Journal of animal physiology and animal nutrition* 103, 305-316.
- Santos-Vigil KI, Ilhuicatz-Alvarado D, Garcia-Hernandez AL, Herrera-Garcia JS and Moreno-Fierros L, 2018. Study of the allergenic potential of *Bacillus thuringiensis* Cry1Ac toxin following intra-gastric administration in a murine model of food-allergy. *International immunopharmacology* 61, 185-196.
- Seide VE, Bernardes RC, Pereira EJG and Lima MAP, 2018. Glyphosate is lethal and Cry toxins alter the development of the stingless bee *Melipona quadrifasciata*. *Environmental pollution (Barking, Essex : 1987)* 243, 1854-1860.
- Sellami S, Jemli S, Abdelmalek N, Cherif M, Abdelkefi-Mesrati L, Tounsi S and Jamoussi K, 2018. A novel Vip3Aa16-Cry1Ac chimera toxin: Enhancement of toxicity against *Ephestia kuehniella*, structural study and molecular docking. *International Journal of Biological Macromolecules* 117, 752-761.
- Shabbir MZ, Quan Y, Wang Z, Bravo A, Soberon M and He K, 2018. Characterization of the Cry1Ah resistance in Asian corn Borer and its cross-resistance to other *Bacillus thuringiensis* toxins. *Scientific Reports* 8, 234.
- Shahid AA, Salisu IB, Yaqoob A, Rao AQ, Ullah I and Husnain T, 2019. Assessing the fate of recombinant plant DNA in rabbit's tissues fed genetically modified cotton. *Journal of animal physiology and animal nutrition*.
- Shelton AM, Hossain MJ, Paranjape V, Azad AK, Rahman ML, Khan ASMMR, Prodhan MZH, Rashid MA, Majumder R, Hossain MA, Hussain SS, Huesing JE and McCandless L, 2018. Bt Eggplant Project in Bangladesh: History, Present Status, and Future Direction. *Frontiers in Bioengineering and Biotechnology* 6, 106.
- Shelton AM, Hossain MJ, Paranjape V, Prodhan MZH, Azad AK, Majumder R, Sarwer SH and Hossain MA, 2019. Bt Brinjal in Bangladesh: The First Genetically Engineered Food Crop in a Developing Country. *Cold Spring Harbor perspectives in biology* 11.
- Siddiqui HA, Asif M, Asad S, Naqvi RZ, Ajaz S, Umer N, Anjum N, Rauf I, Sarwar M, Arshad M, Amin I, Saeed M, Mukhtar Z, Bashir A and Mansoor S, 2019. Development and evaluation of double gene transgenic cotton lines expressing Cry toxins for protection against chewing insect pests. *Scientific Reports* 9, 11774.
- Signorini AM, Abratti G, Grimi D, Machado M, Bunge FF, Parody B, Ramos L, Cortese P, Vesprini F, Whelan A, Araujo MP, Podworny M, Cadile A and Malacarne MF, 2018. Management of Field-Evolved Resistance to Bt Maize in Argentina: A Multi-Institutional Approach. *Frontiers in Bioengineering and Biotechnology* 6, 67.
- Silva LM, Silva MC, Silva SMFA, Alves RC, Siqueira HAA and Marques EJ, 2018. Toxin Gene Contents and Activity of *Bacillus thuringiensis* Strains Against Two Sugarcane Borer Species, *Diatraea saccharalis* (F.) and *D. flavipennella* (Box). *Neotropical Entomology* 47, 292-301.
- Sivamani E, Nalapalli S, Prairie A, Bradley D, Richbourg L, Strebe T, Liebler T, Wang D

- p>and Que Q, 2019. A study on optimization of pat gene expression cassette for maize transformation.
- Molecular Biology Reports*
- 46, 3009-3017.
- Smith JL, Baute TS, Sebright MM, Schaafsma AW and DiFonzo CD, 2018. Establishment of *Striacosta albicosta* (Lepidoptera: Noctuidae) as a Primary Pest of Corn in the Great Lakes Region. *Journal of Economic Entomology* 111, 1732-1744.
- Smith JL, Limay-Rios V, Hooker DC and Schaafsma AW, 2018. *Fusarium graminearum* Mycotoxins in Maize Associated With *Striacosta albicosta* (Lepidoptera: Noctuidae) Injury. *Journal of Economic Entomology* 111, 1227-1242.
- Smith JL, Farhan Y and Schaafsma AW, 2019. Practical Resistance of *Ostrinia nubilalis* (Lepidoptera: Crambidae) to Cry1F *Bacillus thuringiensis* maize discovered in Nova Scotia, Canada. *Scientific Reports* 9, 18247.
- Soares Figueiredo C, Nunes Lemes AR, Sebastiao I and Desiderio JA, 2019. Synergism of the *Bacillus thuringiensis* Cry1, Cry2, and Vip3 Proteins in *Spodoptera frugiperda* Control. *Applied Biochemistry and Biotechnology* 188, 798-809.
- Song X, Chang L, Reddy GVP, Zhang L, Fan C and Wang B, 2019. Use of Taxonomic and Trait-Based Approaches to Evaluate the Effects of Transgenic Cry1Ac Corn on the Community Characteristics of Soil Collembola. *Environmental Entomology* 48, 263-269.
- Souza CSF, Silveira LCP, Paula DP, Andow DA and Mendes SM, 2018. Transfer of Cry1F from Bt maize to eggs of resistant *Spodoptera frugiperda*. *Plos One* 13, e0203791.
- Tabashnik BE and Carriere Y, 2019. Global Patterns of Resistance to Bt Crops Highlighting Pink Bollworm in the United States, China, and India. *Journal of Economic Entomology* 112, 2513-2523.
- Tang Q, Yang Z, Han R, Zhang Y, Shen C and Wang J, 2019. No Effect of Bt-transgenic Rice on the Tritrophic Interaction of the Stored Rice, the Maize Weevil *Sitophilus Zeamais* and the Parasitoid Wasp *Theocolax elegans*. *Scientific Reports* 9, 4306.
- Tessnow AE, Behmer ST, Walsh TK and Sword GA, 2018. Protein-carbohydrate regulation in *Helicoverpa amigera* and *H. punctigera* and how diet protein-carbohydrate content affects insect susceptibility to Bt toxins. *Journal of insect physiology* 106, 88-95.
- Thornby D, Werth J, Hereward J, Keenan M and Chauhan BS, 2018. Herbicide resistance evolution can be tamed by diversity in irrigated Australian cotton: a multi-species, multi-herbicide modelling approach. *Pest Management Science* 74, 2363-2375.
- Tian J-C, Wang X-P, Chen Y, Romeis J, Naranjo SE, Hellmich RL, Wang P and Shelton AM, 2018. Bt cotton producing Cry1Ac and Cry2Ab does not harm two parasitoids, *Cotesia marginiventris* and *Copidosoma floridanum*. *Scientific Reports* 8, 307.
- Vanti GL, Katageri IS, Inamdar SR, Hiremathada V and Swamy BM, 2018. Potent insect gut binding lectin from *Sclerotium rolfsii* impart resistance to sucking and chewing type insects in cotton. *Journal of biotechnology* 278, 20-27.
- Vassallo CN, Figueroa Bunge F, Signorini AM, Valverde-Garcia P, Rule D and Babcock J, 2019. Monitoring the Evolution of Resistance in *Spodoptera frugiperda* (Lepidoptera: Noctuidae) to the Cry1F Protein in Argentina. *Journal of Economic Entomology* 112, 1838-1844.
- Walsh T, James B, Chakroun M, Ferre J and Downes S, 2018. Isolating, characterising and identifying a Cry1Ac resistance mutation in field populations of *Helicoverpa punctigera*. *Scientific Reports* 8, 2626.
- Wang C, Li W, Kessenich CR, Petrick JS, Rydel TJ, Sturman EJ, Lee TC, Glenn KC and Edrington TC, 2018. Safety of the *Bacillus thuringiensis*-derived Cry1A.105 protein: Evidence that domain exchange preserves mode of action and safety.

- Regulatory toxicology and pharmacology : RTP 99, 50-60.
- Wang G, Dong Y, Liu X, Yao G, Yu X and Yang M, 2018. The Current Status and Development of Insect-Resistant Genetically Engineered Poplar in China. *Frontiers in Plant Science* 9, 1408.
- Wang L, Ma Y, Wan P, Liu K, Xiao Y, Wang J, Cong S, Xu D, Wu K, Fabrick JA, Li X and Tabashnik BE, 2018. Resistance to *Bacillus thuringiensis* linked with a cadherin transmembrane mutation affecting cellular trafficking in pink bollworm from China. *Insect Biochemistry and Molecular Biology* 94, 28-35.
- Wang Y, Li D, Zhou H, Liu H, Niu L, Wang L and Ma W, 2018. Evaluation of Cry1Ac and Cry2Aa Toxin Binding to Two Important Beneficial Cotton Field Insects, *Harmonia axyridis* and *Orius similis*. *Journal of Agricultural and Food Chemistry* 66, 8698-8702.
- Wang YH, Chen JP, Gao J, Zhang X, Chen Y and Chen DH, 2018. Effect of soil salinity on insecticidal protein expression in flower buds of Bt cotton. *Ying yong sheng tai xue bao = The journal of applied ecology* 29, 3017-3023.
- Wang J, Xu D, Wang L, Cong S, Wan P, Lei C, Fabrick JA, Li X, Tabashnik BE and Wu K, 2019. Bt resistance alleles in field populations of pink bollworm from China: Similarities with the United States and decreased frequency from 2012 to 2015. *Pest Management Science*.
- Wang J, Zuo Y-Y, Li L-L, Wang H, Liu S-Y, Yang Y-H and Wu Y-D, 2019. Knockout of three aminopeptidase N genes does not affect susceptibility of *Helicoverpa armigera* larvae to *Bacillus thuringiensis* Cry1A and Cry2A toxins. *Insect Science*.
- Wang J-d, Zhang J-S, Guo Y-F, Chen L-F, Wang F-L, Huang M-T, Gao S-J and Wang R, 2019. Molecular cloning, characterization, and expression profiling analysis of Cry toxin receptor genes from sugarcane shoot borer *Chilo infuscatellus* (Snellen). *Pesticide Biochemistry and Physiology* 157, 186-195.
- Wang L, Ma Y, Guo X, Wan P, Liu K, Cong S, Wang J, Xu D, Xiao Y, Li X, Tabashnik BE and Wu K, 2019. Pink Bollworm Resistance to Bt Toxin Cry1Ac Associated with an Insertion in Cadherin Exon 20. *Toxins* 11.
- Wang L, Wang J, Ma Y, Wan P, Liu K, Cong S, Xiao Y, Xu D, Wu K, Fabrick JA, Li X and Tabashnik BE, 2019. Transposon insertion causes cadherin mis-splicing and confers resistance to Bt cotton in pink bollworm from China. *Scientific Reports* 9, 7479.
- Wang Y, Quan Y, Yang J, Shu C, Wang Z, Zhang J, Gatehouse AMR, Tabashnik BE and He K, 2019. Evolution of Asian Corn Borer Resistance to Bt Toxins Used Singly or in Pairs. *Toxins* 11.
- Wang Y, Wang J, Fu X, Nageotte JR, Silverman J, Bretsnyder EC, Chen D, Rydel TJ, Bean GJ, Li KS, Kraft E, Gowda A, Nance A, Moore RG, Pleau MJ, Milligan JS, Anderson HM, Asiimwe P, Evans A, Moar WJ, Martinelli S, Head GP, Haas JA, Baum JA, Yang F, Kerns DL and Jerga A, 2019. *Bacillus thuringiensis* Cry1Da₇ and Cry1B.868 Protein Interactions with Novel Receptors Allow Control of Resistant Fall Armyworms, *Spodoptera frugiperda* (J.E. Smith). *Applied and Environmental Microbiology* 85.
- Wei J, Liang G, Wu K, Gu S, Guo Y, Ni X and Li X, 2018. Cytotoxicity and binding profiles of activated Cry1Ac and Cry2Ab to three insect cell lines. *Insect Science* 25, 655-666.
- Wei J, Yang S, Chen L, Liu X, Du M, An S and Liang G, 2018. Transcriptomic Responses to Different Cry1Ac Selection Stresses in *Helicoverpa armigera*. *Frontiers in Physiology* 9, 1653.

-
- Wei J, Zhang L, Yang S, Xie B, An S and Liang G, 2018. Assessment of the lethal and sublethal effects by spinetoram on cotton bollworm. *Plos One* 13, e0204154.
- Wei J, Zhang M, Liang G and Li X, 2019. Alkaline phosphatase 2 is a functional receptor of Cry1Ac but not Cry2Ab in *Helicoverpa zea*. *Insect Molecular Biology* 28, 372-379.
- Wu AJ, Chapman K, Sathischandra S, Massengill J, Araujo R, Soria M, Bugas M, Bishop Z, Haas C, Holliday B, Cisneros K, Lor J, Canez C, New S, Mackie S, Ghoshal D, Privalle L, Hunst P and Pallett K, 2019. GHB614 * T304-40 * GHB119 * COT102 Cotton: Protein Expression Analyses of Field-Grown Samples. *Journal of Agricultural and Food Chemistry* 67, 275-281.
- Xiao Y and Wu K, 2019. Recent progress on the interaction between insects and *Bacillus thuringiensis* crops. *Philosophical transactions of the Royal Society of London Series B, Biological sciences* 374, 20180316.
- Xie X, Cui Z, Wang Y, Wang Y, Cao F, Romeis J, Peng Y and Li Y, 2018. *Bacillus thuringiensis* Maize Expressing a Fusion Gene Cry1Ab/Cry1AcZM Does Not Harm Valued Pollen Feeders. *Toxins* 11.
- Xing Y, Qin Z, Feng M, Li A, Zhang L, Wang Y, Dong X, Zhang Y, Tan S and Shi W, 2019. The impact of Bt maize expressing the Cry1Ac protein on non-target arthropods. *Environmental science and pollution research international* 26, 5814-5819.
- Yang F, Morsello S, Head GP, Sansone C, Huang F, Gilreath RT and Kerns DL, 2018. F2 screen, inheritance and cross-resistance of field-derived Vip3A resistance in *Spodoptera frugiperda* (Lepidoptera: Noctuidae) collected from Louisiana, USA. *Pest Management Science* 74, 1769-1778.
- Yang J, Quan Y, Sivaprasath P, Shabbir MZ, Wang Z, Ferre J and He K, 2018. Insecticidal Activity and Synergistic Combinations of Ten Different Bt Toxins against *Mythimna separata* (Walker). *Toxins* 10.
- Yang F, Gonzalez JCS, Williams J, Cook DC, Gilreath RT, Kerns and David L, 2019. Occurrence and Ear Damage of *Helicoverpa zea* on Transgenic *Bacillus thuringiensis* Maize in the Field in Texas, U.S. and Its Susceptibility to Vip3A Protein. *Toxins* 11.
- Zanga D, Sanahuja G, Eizaguirre M, Albajes R, Christou P, Capell T, Fraser P, Gerrisch C and Lopez C, 2018. Carotenoids moderate the effectiveness of a Bt gene against the European corn borer, *Ostrinia nubilalis*. *Plos One* 13, e0199317.
- Zhang X, Gao T, Peng Q, Song L, Zhang J, Chai Y, Sun D and Song F, 2018. A strong promoter of a non-cry gene directs expression of the cry1Ac gene in *Bacillus thuringiensis*. *Applied Microbiology and Biotechnology* 102, 3687-3699.
- Zhang B, Guo W and Zhang T, 2019. Inheritance of Transgenes in Transgenic Bt Lines Resistance to *Helicoverpa armigera* in Upland Cotton. *Methods in molecular biology* (Clifton, NJ) 1902, 199-210.
- Zhang L, Lu G, Huang X, Guo H, Su X, Han L, Zhang Y, Qi Z, Xiao Y and Cheng H, 2019. Overexpression of the caryophyllene synthase gene GhTPS1 in cotton negatively affects multiple pests while attracts parasitoids. *Pest Management Science*.
- Zhang M, Wei J, Ni X, Zhang J, Jurat-Fuentes JL, Fabrick JA, Carriere Y, Tabashnik BE and Li X, 2019. Decreased Cry1Ac activation by midgut proteases associated with Cry1Ac resistance in *Helicoverpa zea*. *Pest Management Science* 75, 1099-1106.
- Zhao M, Li Y, Yuan X, Liang G, Wang B, Liu C and Khaing MM, 2018. Establishment of a dietary exposure assay for evaluating the toxicity of insecticidal compounds to *Apolygus lucorum* (Hemiptera: Miridae). *Environmental pollution* (Barking, Essex

- : 1987) 237, 414-423.
- Zhaolei L, Naishun B, Xueping C, Jun C, Manqiu X, Zhiping S, Ming N and Changming F, 2018. Soil incubation studies with Cry1Ac protein indicate no adverse effect of Bt crops on soil microbial communities. *Ecotoxicology and Environmental Safety* 152, 33-41.
- Zhong J, Hu X, Zhang X, Liu Y, Xu C, Zhang C, Lin M and Liu X, 2018. Broad specificity immunoassay for detection of *Bacillus thuringiensis* Cry toxins through engineering of a single chain variable fragment with mutagenesis and screening. *International Journal of Biological Macromolecules* 107, 920-928.
- Zhou D, Liu X, Gao S, Guo J, Su Y, Ling H, Wang C, Li Z, Xu L and Que Y, 2018. Foreign cry1Ac gene integration and endogenous borer stress-related genes synergistically improve insect resistance in sugarcane. *Bmc Plant Biology* 18, 342.
- Zhou L, Alphey N, Walker AS, Travers LM, Hasan F, Morrison NI, Bonsall MB and Raymond B, 2018. Combining the high-dose/refuge strategy and self-limiting transgenic insects in resistance management-A test in experimental mesocosms. *Evolutionary Applications* 11, 727-738.
- Zhou J, Guo Z, Kang S, Qin J, Gong L, Sun D, Guo L, Zhu L, Bai Y, Zhang Z, Zhou X and Zhang Y, 2019. Reduced expression of the P-glycoprotein gene PxABCB1 is linked to resistance to *Bacillus thuringiensis* Cry1Ac toxin in *Plutella xylostella* (L.). *Pest Management Science*.
- Zhou L, Alphey N, Walker AS, Travers LM, Morrison NI, Bonsall MB and Raymond B, 2019. The application of self-limiting transgenic insects in managing resistance in experimental metapopulations. *The Journal of applied ecology* 56, 688-698.
- Zhu B, Sun X, Nie X, Liang P and Gao X, 2019. MicroRNA-998-3p contributes to Cry1Ac-resistance by targeting ABCC2 in lepidopteran insects. *Insect Biochemistry and Molecular Biology* 103283.
- Zubair M, Latif A, Rao AQ, Azam S, Shahid N, Samiullah TR, Yasmeen A, Shahid AA, Nasir IA and Husnain T, 2019. A Combinational Approach of Enhanced Methanol Production and Double Bt Genes for Broad Spectrum Insect Resistance in Transgenic Cotton. *Molecular biotechnology* 61, 663-673.

4. Entries retrieved using Europe PMC

- Fleming D, Musser F, Reisig D, Greene J, Taylor S, Parajulee M, Lorenz G, Catchot A, Gore J, Kerns D, Stewart S, Boykin D, Caprio M and Little N, 2018. Effects of transgenic *Bacillus thuringiensis* cotton on insecticide use, heliothine counts, plant damage, and cotton yield: A meta-analysis, 1996-2015. In: *Plos One*. p e0200131.
- Fraiture M-A, Vandamme J, Herman P and Roosens NHC, 2018. Development and validation of an integrated DNA walking strategy to detect GMO expressing cry genes. In: *Bmc Biotechnology*. p 40.
- Marques LH, Santos AC, Castro BA, Storer NP, Babcock JM, Lepping MD, Sa V, Moscardini VF, Rule DM and Fernandes OA, 2018. Impact of transgenic soybean expressing Cry1Ac and Cry1F proteins on the non-target arthropod community associated with soybean in Brazil. In: *Plos One*. p e0191567.
- Shukla M, Al-Busaidi KT, Trivedi M and Tiwari RK, 2018. Status of research, regulations and challenges for genetically modified crops in India. *GM crops & food* 9, 173-188.
- Yang F, González JCS, Williams J, Cook DC, Gilreath RT, Kerns and David L, 2019. Occurrence and Ear Damage of *Helicoverpa zea* on Transgenic *Bacillus thuringiensis* Maize in the Field in Texas, U.S. and Its Susceptibility to Vip3A

Protein. In: Toxins.

5. Entries retrieved using reference lists of opinions of regulatory bodies and screened on full text¹⁶

None

6. New entries retrieved using all search strategies (excluding duplicates and studies retrieved by the previous searches conducted in 2018)

- Abbas MST, 2018. Genetically engineered (modified) crops (Bacillus thuringiensis crops) and the world controversy on their safety. Egyptian Journal of Biological Pest Control 28, 12.
- Abdelgaffar H, Tague ED, Gonzalez HFC, Campagna SR and Jurat-Fuentes JL, 2019. Midgut metabolomic profiling of fall armyworm (Spodoptera frugiperda) with field-evolved resistance to Cry1F corn. Insect Biochemistry and Molecular Biology 106, 1-9.
- Abdelgaffar HM, Oppert C, Sun XC, Monserrate J and Jurat-Fuentes JL, 2019. Differential heliothine susceptibility to Cry1Ac associated with gut proteolytic activity. Pesticide Biochemistry and Physiology 153, 1-8.
- Abudulai M, Chamba EB, Nboyine JA, Adombilla R, Yahaya I, Seidu A and Kangben F, 2018. Field efficacy of genetically modified FK 95 Bollgard II cotton for control of bollworms, Lepidoptera, in Ghana. Agriculture and Food Security 7, (3 November 2018).
- Ahmad S, Cheema HMN, Khan AA, Khan RSA and Ahmad JN, 2019. Resistance status of Helicoverpa armigera against Bt cotton in Pakistan. Transgenic Research 28, 199-212.
- Ai XY, Ren SW, Liu N, Huang LN and Liu XN, 2019. Transgenic tobacco expressing dsRNA of the arginine kinase gene exhibits enhanced resistance against Helicoverpa armigera. Bulletin of Insectology 72, 115-124.
- Akhtar MN and Farooq A, 2019. Predator Prey Interaction between Lepidopteran Pests and Coccinellids Insects of Cotton in Southern Punjab Pakistan. Pakistan Journal of Zoology 51, 583-589.
- Alvarado DI, Vigil KIS, Jacobo ISB and Morenofierros L, 2019. Bacillus thuringiensis Cry1Ac toxin induces MAPKs activation and allergenic effects in intestinal and immune cells. European Journal of Immunology 49, 1356-1356.
- Anderson JA, Ellsworth PC, Faria JC, Head GP, Owen MDK, Pilcher CD, Shelton AM and Meissle M, 2019. Genetically Engineered Crops: Importance of Diversified Integrated Pest Management for Agricultural Sustainability. Frontiers in Bioengineering and Biotechnology 7, 14.
- Anjum R, Baloch MJ, Baloch GM and Chachar Q, 2019. SIGNIFICANCE OF CROSS COMBINATIONS FOR DEVELOPING Bt COTTON VARIETIES FOR OPTIMUM GENE (CRY1AC) EXPRESSION LEVEL REQUIRED FOR BETTER BOLLWORM CONTROL. Journal of Animal and Plant Sciences 29, 531-538.
- Archibald WR, Bradshaw JD, Golick DA, Wright RJ and Peterson JA, 2018. Nebraska Growers' and Crop Consultants' Knowledge and Implementation of Integrated Pest Management of Western Bean Cutworm. Journal of Integrated Pest Management 9, 7.
- Aziz E, Batool R, Akhtar W, Rehman S, Gregersen PL and Mahmood T, 2019. Expression

¹⁶ The time-period is applied post-hoc as described in Table 2

- analysis of the polyphenol oxidase gene in response to signaling molecules, herbivory and wounding in antisense transgenic tobacco plants. 3 Biotech 9, 13.
- Bahar MH, Stanley J, Backhouse D, Mensah R, Del Socorro A and Gregg P, 2019. Survival of *Helicoverpa armigera* larvae on and Bt toxin expression in various parts of transgenic Bt cotton (Bollgard II) plants. *Entomologia Experimentalis Et Applicata* 167, 415-423.
- Bakhsh A, Dinc T, Hussain T, Demirel U, Aasim M and Caliskan ME, 2018. Development of transgenic tobacco lines with pyramided insect resistant genes. *Turkish Journal of Biology* 42, 174-186.
- Bel Y, Zack M, Narva K and Escrache B, 2019. Specific binding of *Bacillus thuringiensis* Cry1Ea toxin, and Cry1Ac and Cry1Fa competition analyses in *Anticarsia gemmatilis* and *Chrysodeixis includens*. *Scientific Reports* 9, 18201.
- Bengyella L, Yekwa EL, Iftikhar S, Nawaz K, Jose RC, Fonmboh DJ, Tambo E and Roy P, 2018. Global challenges faced by engineered *Bacillus thuringiensis* Cry genes in soybean (*Glycine max* L.) in the twenty-first century. 3 Biotech 8, 15.
- Bilbo TR, Reay-Jones FPF, Reisig DD, Musser FR and Greene JK, 2018. Effects of Bt Corn on the Development and Fecundity of Corn Earworm (Lepidoptera: Noctuidae). *Journal of Economic Entomology* 111, 2233-2241.
- Bilbo TR, Reay-Jones FPF, Reisig DD and Greene JK, 2019. Susceptibility of Corn Earworm (Lepidoptera: Noctuidae) to Cry1A.105 and Cry2Ab2 in North and South Carolina. *Journal of Economic Entomology* 112, 1845-1857.
- Bilbo TR, Reay-Jones FPF, Reisig DD, Greene JK and Turnbull MW, 2019. Development, survival, and feeding behavior of *Helicoverpa zea* (Lepidoptera: Noctuidae) relative to Bt protein concentrations in corn ear tissues. *Plos One* 14, 25.
- Bird LJ, 2018. Pyrethroid and carbamate resistance in Australian *Helicoverpa armigera* (Lepidoptera: Noctuidae) from 2008 to 2015: what has changed since the introduction of Bt cotton? *Bulletin of Entomological Research* 108, 781-791.
- Boaventura D, Ulrich J, Lueke B, Bolzan A, Okuma D, Gutbrod O, Geibel S, Zeng Q, Dourado PM, Martinelli S, Flagel L, Head G and Nauen R, 2019. Molecular characterization of Cry1F resistance in fall armyworm, *Spodoptera frugiperda* from Brazil. *Insect Biochemistry and Molecular Biology* 116, 103280.
- Bohn T, 2018. Criticism of EFSA's scientific opinion on combinatorial effects of 'stacked' GM plants. *Food and Chemical Toxicology* 111, 268-274.
- Boonchaisri S, Rochfort S, Stevenson T and Dias DA, 2019. Recent developments in metabolomics-based research in understanding transgenic grass metabolism. *Metabolomics* 15, 19.
- Boonmee K, Thammasittirong SNR and Thammasittirong A, 2019. Molecular characterization of lepidopteran-specific toxin genes in *Bacillus thuringiensis* strains from Thailand. 3 Biotech 9, 11.
- Botha AS, Erasmus A, du Plessis H and Van den Berg J, 2019. Efficacy of Bt Maize for Control of *Spodoptera frugiperda* (Lepidoptera: Noctuidae) in South Africa. *Journal of Economic Entomology* 112, 1260-1266.
- Bowling AJ, Sopko MS, Tan SY, Larsen CM, Pence HE and Zack MD, 2019. Insecticidal Activity of a Vip3Ab1 Chimera Is Conferred by Improved Protein Stability in the Midgut of *Spodoptera eridania*. *Toxins* 11, 17.
- Bowman HD, Barber T, Norsworthy JK and Coffman WD, 2018. Addition of fluridone in Bollgard II XtendFlex cotton herbicide programs. *Research Series - Arkansas Agricultural Experiment Station* 77-80.
- Braswell LR, Reisig DD, Sorenson CE and Collins GD, 2019. *Helicoverpa zea*

- (Lepidoptera: Noctuidae) Preference for Plant Structures, and Their Location, Within Bt Cotton Under Different Nitrogen and Irrigation Regimes. *Journal of Economic Entomology* 112, 1741-1751.
- Braswell LR, Reisig DD, Sorenson CE and Collins GD, 2019. *Helicoverpa zea* (Lepidoptera: Noctuidae) Oviposition and Larval Vertical Distribution in Bt Cotton Under Different Levels of Nitrogen and Irrigation. *Journal of Economic Entomology* 112, 1237-1250.
- Braswell LR, Reisig DD, Sorenson CE and Collins GD, 2019. Development and Dispersal of *Helicoverpa zea* (Lepidoptera: Noctuidae) on Non-Bt and Bt Pyramided Cotton. *Environmental Entomology* 48, 465-477.
- Brown ZS, 2018. VOLUNTARY PROGRAMS TO ENCOURAGE REFUGES FOR PESTICIDE RESISTANCE MANAGEMENT: LESSONS FROM A QUASI-EXPERIMENT. *American Journal of Agricultural Economics* 100, 844-867.
- Campos SO, Santana IV, Silva C, Santos-Amaya OF, Guedesa RNC and Pereira EJG, 2019. Bt-induced hormesis in Bt-resistant insects: Theoretical possibility or factual concern? *Ecotoxicology and Environmental Safety* 183, 8.
- Caprio MA, Kurtz R, Catchot A, Kerns D, Reisig D, Gore J and Reay-Jones FPF, 2019. The Corn-Cotton Agroecosystem in the Mid-Southern United States: What Insecticidal Event Pyramids Should be Used in Each Crop to Extend Vip3A Durability. *Journal of Economic Entomology* 112, 2894-2906.
- Carolina GMD, Reyes FC, Gonzalez-Vazquez VM, Garcia-Martinez O, Aguirre-Uribe LA, Tiscareno-Iracheta MA, Aguilar-Gonzalez CN and Rodriguez-Herrera R, 2018. Populations of *Heliothis virescens* (Fabricius, 1777) and *Helicoverpa zea* (Boddie, 1850) (LEPIDOPTERA: NOCTUIDAE) associated with transgenic and non-transgenic cotton and its resistance to the toxin BT. *Revista Bio Ciencias* 5, 19.
- Carriere Y, Williams JL, Crowder DW and Tabashnik BE, 2018. Genotype-specific fitness cost of resistance to Bt toxin Cry1Ac in pink bollworm. *Pest Management Science* 74, 2496-2503.
- Carriere Y, Degain B, Unnithan GC, Harpold VS, Li X and Tabashnik BE, 2019. Seasonal Declines in Cry1Ac and Cry2Ab Concentration in Maturing Cotton Favor Faster Evolution of Resistance to Pyramided Bt Cotton in *Helicoverpa zea* (Lepidoptera: Noctuidae). *Journal of Economic Entomology* 112, 2907-2914.
- Carriere Y, Yelich AJ, Degain B, Harpold VS, Unnithan GC, Kim JH, Mathew LG, Head GP, Rathore KS, Fabrick JA and Tabashnik BE, 2019. Gossypol in cottonseed increases the fitness cost of resistance to Bt cotton in pink bollworm. *Crop Protection* 126, 8.
- Chang M, Zhao D, Zhang Y, Xu C, Lu X and Guo W, 2019. In vitro binding characteristics of three kinds of Bt proteins in the midgut alkaline phosphatase HcALP1 of *Bacillus thuringiensis*. *Acta Sericologica Sinica* 331-337.
- Chaudhari K, Desai HR and Patel NM, 2018. Determination of economic threshold level of cotton leafhopper (*Amarasca biguttula biguttula* Ishida) on cotton under south Gujarat condition. *Trends in Biosciences* 11, 52-57.
- Chen L, Wei JZ, Liu C, Zhang WN, Wang BJ, Niu LL and Liang GM, 2018. Specific Binding Protein ABCC1 Is Associated With Cry2Ab Toxicity in *Helicoverpa armigera*. *Frontiers in Physiology* 9, 11.
- Chen WB, Liu CX, Lu GQ, Chen HM, She ZC and Wu KM, 2018. Effects of Vip3AcAa+Cry1Ac Cotton on Midgut Tissue in *Helicoverpa armigera* (Lepidoptera: Noctuidae). *Journal of Insect Science* 18, 6.
- Chen Y, Li YB, Zhou MY, Rui QZ, Cai ZZ, Zhang X, Chen Y and Chen DH, 2018. Nitrogen

- (N) Application Gradually Enhances Boll Development and Decreases Boll Shell Insecticidal Protein Content in N-Deficient Cotton. *Frontiers in Plant Science* 9, 10.
- Chen WB, Yang XW, Tetreau G, Song XZ, Coutu C, Hegedus D, Blissard G, Fei ZJ and Wang P, 2019. A high-quality chromosome-level genome assembly of a generalist herbivore, *Trichoplusia ni*. *Molecular Ecology Resources* 19, 485-496.
- Chen Y, Li YB, Zhou MY, Cai ZZ, Tambel LIM, Zhang X, Chena Y and Chen D, 2019. Nitrogen deficit decreases seed Cry1Ac endotoxin expression in Bt transgenic cotton. *Plant Physiology and Biochemistry* 141, 114-121.
- Chu B, Zhang S, Luo J, Wang C, Lv L, Zhu X, Wang L and Cui J, 2018. The expression and function of Ghppo1 gene in cotton (*Gossypium hirsutum*) defense. *Journal of Agricultural Biotechnology* 26, 34-42.
- Coffman W, Barber LT, Norsworthy JK, Hill ZT and Bowman HD, 2018. Evaluation of salvage treatment options in XtendFlex cotton. *Research Series - Arkansas Agricultural Experiment Station* 73-76.
- Da Silva IHS, Gomez I, Sanchez J, de Castro DLM, Valicente FH, Soberon M, Polanczyk RA and Bravo A, 2018. Identification of midgut membrane proteins from different instars of *Helicoverpa armigera* (Lepidoptera: Noctuidae) that bind to Cry1Ac toxin. *Plos One* 13, 16.
- da Silva G, Ramos LFC, Seckler HD, Gomes FM, Cortines JR, Ramos I, Anobom CD, Machado ED and de Oliveira DMP, 2019. Biochemical characterization of digestive membrane-associated alkaline phosphatase from the velvet bean caterpillar *Anticarsia gemmatilis*. *Archives of Insect Biochemistry and Physiology* 102, 14.
- Dattatray S, Mangesh P, Bharat C and Srinivas P, 2018. Selection and inheritance of Cry1Ac resistance in eggplant fruit and shoot borer (*Leucinodes orbonalis*). *International Journal of Tropical Agriculture* 36, 159-165.
- de Bortoli CP and Jurat-Fuentes JL, 2019. Mechanisms of resistance to commercially relevant entomopathogenic bacteria. *Current Opinion in Insect Science* 33, 56-62.
- De Paulo PD, Fadini MAM, Marinho CGS and Mendes SM, 2019. DIRECT DEFENSE ELICITED BY *Tetranychus urticae* KOCH (Acari: Tetranychidae) IN Bt MAIZE PLANTS. *Bioscience Journal* 35, 903-909.
- Deng JX, Wang YM, Yang FY, Liu Y and Liu B, 2019. Persistence of insecticidal Cry toxins in Bt rice residues under field conditions estimated by biological and immunological assays. *Science of the Total Environment* 679, 45-51.
- Dhanaraj AL, Willse AR and Kamath SP, 2019. Stability of expression of Cry1Ac and Cry2Ab2 proteins in Bollgard-II hybrids at different stages of crop growth in different genotypes across cropping seasons and multiple geographies. *Transgenic Research* 28, 33-50.
- Dhanian NK, Chauhan VK, Chaitanya RK and Dutta-Gupta A, 2019. Midgut de novo transcriptome analysis and gene expression profiling of *Achaea janata* larvae exposed with *Bacillus thuringiensis* (Bt)-based biopesticide formulation. *Comparative Biochemistry and Physiology D-Genomics & Proteomics* 30, 81-90.
- Ding RF, Ma DY, Uwais A, Wang DM, Liu J, Xu Y, Li HB, Li HQ and Pan HS, 2019. Transgenic Cry1Ac cotton does not affect the development and fecundity of *Chrysoperla carnea*. *Plos One* 14, 12.
- Dominguez-Mendez R, Alcantara-de la Cruz R, Rojano-Delgado AM, da Silveira HM, Portugal J, Cruz-Hipolito HE and De Prado R, 2019. Stacked traits conferring multiple resistance to imazamox and glufosinate in soft wheat. *Pest Management Science* 75, 648-657.
- Dong S, Liu Y, Zhang X, Xu CX, Liu XJ and Zhang CZ, 2019. Development of an

- immunochromatographic assay for the specific detection of *Bacillus thuringiensis* (Bt) Cry1Ab toxin. *Analytical Biochemistry* 567, 1-7.
- Dowd PF and Johnson ET, 2018. Overexpression of a maize (*Zea mays*) defensin-like gene in maize callus enhances resistance to both insects and fungi. *Agri Gene* 9, 16-23.
- Eghrari K, de Brito AH, Baldassi A, Balbuena TS, Fernandes OA and Moro GV, 2019. Homozygosis of Bt locus increases Bt protein expression and the control of *Spodoptera frugiperda* (Lepidoptera: Noctuidae) in maize hybrids. *Crop Protection* 124, 7.
- Eisenring M, Naranjo SE, Bacher S, Abbott A, Meissle M and Romeis J, 2019. Reduced caterpillar damage can benefit plant bugs in Bt cotton. *Scientific Reports* 9, 9.
- El-Husseini MMM, 2018. Impact of climate change induced by global weather engineering technology of "chemtrails" on plant protection. *Arab Journal of Plant Protection* 36, 80-85.
- Erlandson MA, Toprak U and Hegedus DD, 2019. Role of the peritrophic matrix in insect-pathogen interactions. *Journal of Insect Physiology* 117, 11.
- Fabrick JA, Mathew LG, LeRoy DM, Hull JJ, Unnithan GC, Yelich AJ, Carriere Y, Li X and Tabashnik BE, 2020. Reduced cadherin expression associated with resistance to Bt toxin Cry1Ac in pink bollworm. *Pest Management Science* 76, 67-74.
- Fan S, Jarwar AH, Wang X, Wang L and Ma Q, 2018. Overview of the cotton in Pakistan and its future prospects. *Pakistan Journal of Agricultural Research* 31, 396-407.
- Fand BB, Nagrare S, Gawande SP, Nagrale UT, Naikwadi BV, Deshmukh V, Gokte-Narkhedkar N and Waghmare VN, 2019. Widespread infestation of pink bollworm, *Pectinophora gossypiella* (Saunders) (Lepidoptera: Gelechiidae) on Bt cotton in Central India: a new threat and concerns for cotton production. *Phytoparasitica* 47, 313-325.
- Fernandes MG, Araujo RPd, Costa EN, Zangirolymo ACTA and Pereira RM, 2019. Influence of Cry1Ac toxin from Bt cotton on the soil microbiota. *Journal of Agricultural Science (Toronto)* 11, 364-380.
- Fernandes MG, Costa EN, Dutra CC and Raizer J, 2019. Species richness and community composition of ants and beetles in Bt and non-Bt maize fields. *Environmental Entomology* 48, 1095-1103.
- Figueiredo CS, Lemes ARN, Sebastiao I and Desiderio JA, 2019. Synergism of the *Bacillus thuringiensis* Cry1, Cry2, and Vip3 Proteins in *Spodoptera frugiperda* Control. *Applied Biochemistry and Biotechnology* 188, 798-809.
- Flagel L, Lee YW, Wanjugi H, Swarup S, Brown A, Wang JL, Kraft E, Greenplate J, Simmons J, Adams N, Wang YF, Martinelli S, Haas JA, Gowda A and Head G, 2018. Mutational disruption of the ABCC2 gene in fall armyworm, *Spodoptera frugiperda*, confers resistance to the Cry1Fa and Cry1A.105 insecticidal proteins. *Scientific Reports* 8, 11.
- Fu JM, Song XL, Liu B, Shi Y, Shen WJ, Fang ZX and Zhang L, 2018. Fitness Cost of Transgenic cry1Ab/c Rice Under Saline-Alkaline Soil Condition. *Frontiers in Plant Science* 9, 13.
- Funichello M, Fraga DF, Prado EP, Aguirre-Gil OJ and Busoli AC, 2019. Vertical distribution of *crysodeixis includens* (Lepidoptera: Noctuidae) in transgenic and conventional cotton cultivars
- Distribuicao vertical de *Crysodeixis includens* (Lepidoptera: Noctuidae) em cultivar transgenica e convencional de algodoeiro. *Revista de Ciencias Agroveterinarias* 18, 150-153.
- G Montezano D, Hunt TE, Specht A, C Luz PM and Peterson JA, 2019. Survival and

- Development of *Striacosta albicosta* (Smith) (Lepidoptera: Noctuidae) Immature Stages on Dry Beans, non-Bt, Cry1F, and Vip3A Maize. *Insects* 10.
- Gao M, Dong S, Hu X, Zhang X, Liu Y, Zhong J, Lu L, Wang Y, Chen L and Liu X, 2019. Roles of Midgut Cadherin from Two Moths in Different *Bacillus thuringiensis* Action Mechanisms: Correlation among Toxin Binding, Cellular Toxicity, and Synergism. *Journal of Agricultural and Food Chemistry* 67, 13237-13246.
- Gao MJ, Liu Y, Wang Y, Zhang X, Dong S and Liu XJ, 2019. Newly identified APN splice isoforms suggest novel splicing mechanisms may underlie circRNA circularization in moth. *Febs Open Bio* 9, 1521-1535.
- Garcia AG, Ferreira CP, Godoy WAC and Meagher RL, 2019. A computational model to predict the population dynamics of *Spodoptera frugiperda*. *Journal of Pest Science* 92, 429-441.
- Garcia-Gomez BI, Cano SN, Zagal EE, Dantan-Gonzalez E, Bravo A and Soberon M, 2019. Insect Hsp90 Chaperone Assists *Bacillus thuringiensis* Cry Toxicity by Enhancing Protoxin Binding to the Receptor and by Protecting Protoxin from Gut Protease Degradation. *mBio* 10.
- Gartia J, Barnwal RP, Anangi R, Giri AR, King G and Chary KVR, 2019. H-1, C-13 and N-15 NMR assignments of two plant protease inhibitors (IRD7 and IRD12) from the plant *Capsicum annuum*. *Biomolecular Nmr Assignments* 13, 31-35.
- Gartia J, Barnwal RP, Anangi R, Giri AR, King G and Chary KVR, 2019. ¹H, ¹³C and ¹⁵N NMR assignments of two plant protease inhibitors (IRD7 and IRD12) from the plant *Capsicum annuum*. *Biomolecular Nmr Assignments* 13, 31-35.
- Grizanov EV, Krytsyna TI, Surcova VS and Dubovskiy IM, 2019. The role of midgut nonspecific esterase in the susceptibility of *Galleria mellonella* larvae to *Bacillus thuringiensis*. *Journal of Invertebrate Pathology* 166, 3.
- Guan RB, Chen QY, Li HC, Hu SR, Miao XX, Wang GR and Yang B, 2019. Knockout of the HaREase Gene Improves the Stability of dsRNA and Increases the Sensitivity of *Helicoverpa armigera* to *Bacillus thuringiensis* Toxin. *Frontiers in Physiology* 10, 11.
- Guo WC, Bai C, Wang ZA, Wang P, Fan Q, Mi XX, Wang L, He J, Pang JH, Luo XL, Fu WD, Tian YC, Si HJ, Zhang GL and Wu JH, 2018. Double-Stranded RNAs High-Efficiently Protect Transgenic Potato from *Leptinotarsa decemlineata* by Disrupting Juvenile Hormone Biosynthesis. *Journal of Agricultural and Food Chemistry* 66, 11990-11999.
- Guo J, Yang F, Brown S, Kern D, Head GP, Price PA, Niu Y and Huang F, 2019. Fecundity of the parental and fitness of the F1 populations of corn earworm from refuge ears of seed blend plantings with Genuity SmartStax™ maize. *Crop Protection* 124, 104873.
- Guo W, Kain W and Wang P, 2019. Effects of disruption of the peritrophic membrane on larval susceptibility to Bt toxin Cry1Ac in cabbage loopers. *Journal of Insect Physiology* 117, 6.
- Guo ZJ, Sun D, Kang S, Zhou JL, Gong LJ, Qin JY, Guo L, Zhu LH, Bai Y, Luo L and Zhang YJ, 2019. CRISPR/Cas9-mediated knockout of both the PxABCC2 and PxABCC3 genes confers high-level resistance to *Bacillus thuringiensis* Cry1Ac toxin in the diamondback moth, *Plutella xylostella* (L.). *Insect Biochemistry and Molecular Biology* 107, 31-38.
- Gurlal S, Dwivedi SK and Ravinder N, 2018. Mechanism of resistance for field insects in Bt crops and its management. *Annals of Biology* 34, 152-154.
- Gutha LR, Purushottam D, Veeramachaneni A, Tigulla S, Kodappully V, Enjala C, Rajput

- H, Anderson J, Hong B, Schmidt J and Bagga S, 2018. Expression of endogenous proteins in maize hybrids in a multi-location field trial in India. *Transgenic Research* 27, 331-342.
- Gutierrez AP, 2018. Hybrid Bt cotton: a stranglehold on subsistence farmers in India. *Current Science* 115, 2206-2210.
- Hagenbucher S, Eisenring M, Meissle M, Rathore KS and Romeis J, 2019. Constitutive and induced insect resistance in RNAi-mediated ultra-low gossypol cottonseed cotton. *BMC Plant Biology* 19, (18 July 2019).
- Hao J, Li YH, Wang JX, Xu CX, Gao MJ, Chen W, Zhang X, Hu XD, Liu Y and Liu XJ, 2020. Screening and activity identification of an anti-idiotypic nanobody for Bt Cry1F toxin from the camelid naive antibody phage display library. *Food and Agricultural Immunology* 31, 16.
- Haridas CV and Tenhumberg B, 2018. Modeling effects of ecological factors on evolution of polygenic pesticide resistance. *Journal of Theoretical Biology* 456, 224-232.
- Hazarika N, Boruah RR, Handique PJ, Acharjee S and Sarmah BK, 2019. Reconstruction and validation of three different binary vectors suitable for generation of genetically engineered *Helicoverpa* protected crops. *Indian Journal of Genetics and Plant Breeding* 79, 104-108.
- Hernandez-Juarez A, Aguirre LA, Cerna E, Landeros J, Fries GA, Flores M and Ochoa YM, 2018. Effect of Transgenic Maize on Abundance of the Corn Flea Beetle, *Chaetocnema pulicaria* Melsheimer, as a Non-Target Pest. *Southwestern Entomologist* 43, 841-846.
- Herrero MI, Fogliata SV, Vera A, Casmuz A, Gomez DS, Castagnaro AP, Gastaminza G and Murua MG, 2018. Biological characterization and mating compatibility of *Helicoverpa gelatopoeon* (D.) (Lepidoptera: Noctuidae) populations from different regions in Argentina. *Bulletin of Entomological Research* 108, 108-115.
- Herrero MI, Fogliata SV, Dami LC, Casmuz A, Gastaminza G and Murua MG, 2019. Lack of reproductive isolation in *Helicoverpa gelatopoeon* (Lepidoptera: Noctuidae) populations from different host plant species in Argentina. *Florida Entomologist* 102, 291-297.
- Hilbeck A, Defarge N, Bohn T, Krautter M, Conradin C, Amiel C, Panoff JM and Trtikova M, 2018. Impact of Antibiotics on Efficacy of Cry Toxins Produced in Two Different Genetically Modified Bt Maize Varieties in Two Lepidopteran Herbivore Species, *Ostrinia nubilalis* and *Spodoptera littoralis*. *Toxins* 10, 17.
- Hiltpold I and Hibbard BE, 2018. Indirect Root Defenses Cause Induced Fitness Costs in Bt-Resistant Western Corn Rootworm. *Journal of Economic Entomology* 111, 2349-2358.
- Huang CW, Chen WJ, Ke X, Li YH and Luan YX, 2019. A multi-generational risk assessment of Cry1F on the non-target soil organism *Folsomia candida* (Collembola) based on whole transcriptome profiling. *PeerJ* 7, 18.
- Hussain T, Aksoy E, Caliskan ME and Bakhsh A, 2019. Transgenic potato lines expressing hairpin RNAi construct of molting-associated EcR gene exhibit enhanced resistance against Colorado potato beetle (*Leptinotarsa decemlineata*, Say). *Transgenic Research* 28, 151-164.
- Hussain T, Zia K, Arif MJ and Javed N, 2019. Varietal Expression of Cry1Ac in Cotton and its Concentration Effect on *Helicoverpa armigera* under Laboratory Conditions. *International Journal of Agriculture and Biology* 21, 577-582.
- Ijaz M and Shad SA, 2018. Inheritance mode and realized heritability of resistance to imidacloprid in *Oxycarenus hyalinipennis* Costa (Hemiptera: Lygaeidae). *Crop*

- Protection 112, 90-95.
- Iqbal N, Manalil S, Chauhan BS and Adkins SW, 2019. Glyphosate-tolerant cotton in Australia: successes and failures. *Archives of Agronomy and Soil Science* 65, 1536-1553.
- Istkhar and Chaubey AK, 2018. Challenging the larvae of *Helicoverpa armigera* and assessing the immune responses to nematode-bacterium complex. *Phytoparasitica* 46, 75-87.
- Jadhav MP and Katageri IS, 2018. In planta genetic transformation in cotton (*Gossypium* spp.). *Journal of Farm Sciences* 31, 27-31.
- Jagmit S, Dharminder S and Sukhdev S, 2019. Farmers' perception and evaluation of Bt cotton cultivation in Punjab. *Agricultural Research Journal* 56, 556-563.
- Jerga A, Evdokimov AG, Moshiri F, Haas JA, Chen M, Clinton W, Fu XR, Halls C, Jimenez-Juarez N, Kretzler CN, Panosian TD, Pleau M, Roberts JK, Rydel TJ, Salvador S, Sequeira R, Wang YF, Zheng MY and Baum JA, 2019. Disabled insecticidal proteins: A novel tool to understand differences in insect receptor utilization. *Insect Biochemistry and Molecular Biology* 105, 79-88.
- Jin L, Wang J, Guan F, Zhang JP, Yu S, Liu SY, Xue YY, Li LL, Wu SW, Wang XL, Yang YH, Abdelgaffar H, Jurat-Fuentes JL, Tabashnik BE and Wu YD, 2018. Dominant point mutation in a tetraspanin gene associated with field-evolved resistance of cotton bollworm to transgenic Bt cotton. *Proceedings of the National Academy of Sciences of the United States of America* 115, 11760-11765.
- Jin MH, Liao CY, Chakrabarty S, Wu KM and Xiao YT, 2019. Comparative Proteomics of Peritrophic Matrix Provides an Insight into its Role in Cry1Ac Resistance of Cotton Bollworm *Helicoverpa armigera*. *Toxins* 11, 14.
- Jin M-H, Xiao Y-T, Cheng Y, Hu J, Xue C-B and Wu K-M, 2019. Chromosomal deletions mediated by CRISPR/Cas9 in *Helicoverpa armigera*. *Insect Science* 26, 1029-1036.
- Jones CM, Parry H, Tay WT, Reynolds DR and Chapman JW, 2019. Movement Ecology of Pest *Helicoverpa*: Implications for Ongoing Spread. In: *Annual Review of Entomology*, Vol 64. Ed Douglas AE. Annual Reviews, Palo Alto, 277-295.
- Kahn TW, Chakroun M, Williams J, Walsh T, James B, Monserrate J and Ferre J, 2018. Efficacy and Resistance Management Potential of a Modified Vip3C Protein for Control of *Spodoptera frugiperda* in Maize. *Scientific Reports* 8, 11.
- Kamaraj C, Balasubramani G, Deepak P, Aiswarya D, Arul D, Amutha V, Karthi S and Perumal P, 2018. Bio-pesticidal effects of *Trichoderma viride* formulated titanium dioxide nanoparticle and their physiological and biochemical changes on *Helicoverpa armigera* (Hub.). *Pesticide Biochemistry and Physiology* 149, 26-36.
- Kaur G, Guo JG, Brown S, Head GP, Price PA, Paula-Moraes S, Ni XZ, Dimase M and Huang F, 2019. Field-evolved resistance of *Helicoverpa zea* (Boddie) to transgenic maize expressing pyramided Cry1A.105/Cry2Ab2 proteins in northeast Louisiana, the United States. *Journal of Invertebrate Pathology* 163, 11-20.
- Kennedy RD, Cheavegatti-Gianotto A, de Oliveira WS, Lirette RP and Hjelle JJ, 2018. A General Safety Assessment for Purified Food Ingredients Derived From Biotechnology Crops: Case Study of Brazilian Sugar and Beverages Produced From Insect-Protected Sugarcane. *Frontiers in Bioengineering and Biotechnology* 6, 8.
- Khaing MM, Yang XM, Zhao M, Zhang WN, Wang BJ, Wei JZ and Liang GM, 2018. Effects of antibiotics on biological activity of Cry1Ac in Bt-susceptible and Bt-resistant *Helicoverpa armigera* strains. *Journal of Invertebrate Pathology* 151, 197-200.
- Kumar R, Choudhary A, Kumar S and Shivangi, 2019. Frequency of alleles conferring

- resistance to Bt cotton in North Zone populations of the spotted bollworm, *Earias insulana* (Boisduval). *African Entomology* 27, 58-65.
- Levine SL, Fridley JM and Uffman JP, 2019. Assessing the potential for interaction in insecticidal activity between MON 87751 * MON 87701 produced by conventional breeding. *Environmental Entomology* 48, 1241-1248.
- Li Z, Wang XH, Saurav PS, Li CX, Zhao M, Xin SR, Parajulee MN and Chen FJ, Impacts of Bt maize inoculated with rhizobacteria on development and food utilization of *Mythimna separata*. *Journal of Applied Entomology* 10.
- Li G, Gao L, Huang J, Ji T, Huang B, Tian C, Lu Y and Feng H, 2018. Frequency of Bt resistant alleles in wild cotton bollworm populations. *Chinese Journal of Applied Entomology* 55, 49-54.
- Li L, Luo J, Wu Y, Zhu X, Li C and Cui J, 2018. The effects of transgenic Cry1Ac/1Ab cotton on cotton bollworm control and growth and development of non-target pests. *Journal of Plant Protection* 45, 561-567.
- Li P, Li Y, Shi J, Yu Z, Pan A, Tang X and Ming F, 2018. Impact of transgenic Cry1Ac + CpTI cotton on diversity and dynamics of rhizosphere bacterial community of different root environments. *The Science of the total environment* 637-638, 233-243.
- Li R, Shi JX, Liu BA, Zhang DB, Zhao XX and Yang LT, 2018. International collaborative ring trial of four gene-specific loop-mediated isothermal amplification assays in GMO analysis. *Food Control* 84, 278-283.
- Li Z, Parajulee MN and Chen FJ, 2018. Influence of elevated CO₂ on development and food utilization of armyworm *Mythimna separata* fed on transgenic Bt maize infected by nitrogen-fixing bacteria. *PeerJ* 6, 26.
- Li R, Yang SS, Qiu XF, Lu XQ, Hu QF, Ren XM, Wu BB, Qi LL, Ding XZ, Xia LQ and Sun YJ, 2019. The conserved cysteine residues in *Bacillus thuringiensis* Cry1Ac protoxin are not essential for the bipyramidal crystal formation. *Journal of Invertebrate Pathology* 163, 82-85.
- Li SY, Hussain F, Unnithan GC, Dong SL, UlAbdin Z, Gu SH, Mathew LG, Fabrick JA, Ni XZ, Carriere Y, Tabashnik BE and Li XC, 2019. A long non-coding RNA regulates cadherin transcription and susceptibility to Bt toxin Cry1Ac in pink bollworm, *Pectinophora gossypiella*. *Pesticide Biochemistry and Physiology* 158, 54-60.
- Li X, Ouyang XF, Zhang ZS, He L, Wang Y, Li YH, Zhao J, Chen Z, Wang CN, Ding LL, Pei Y and Xiao YH, 2019. Over-expression of the red plant gene R1 enhances anthocyanin production and resistance to bollworm and spider mite in cotton. *Molecular Genetics and Genomics* 294, 469-478.
- Li Y, Hallerman EM, Wu K and Peng Y, 2019. Insect-Resistant Genetically Engineered Crops in China: Development, Application, and Prospects for Use. *Annual review of entomology*.
- Liao JY, Xue YQ, Xiao GJ, Xie M, Huang ST, You SJ, Wyckhuys KAG and You MS, 2019. Inheritance and fitness costs of resistance to *Bacillus thuringiensis* toxin Cry2Ad in laboratory strains of the diamondback moth, *Plutella xylostella* (L.). *Scientific Reports* 9, 8.
- Lin L, Shao E, Chen X, Zhang J, Huang T and Guan X, 2018. Expression of membrane-bound APN from brown planthopper (*Nilaparvata lugens*) midgut epithelial membrane in Sf9 cell line. *Journal of Agricultural Biotechnology* 26, 839-848.
- Lin P, Cheng T, Feng T, Gong J, Liu C and Xia Q, 2018. Interaction of *Bombyx mori* aminopeptidase N and cadherin-like protein with *Bacillus thuringiensis* Cry1Ac

- toxin. *Sheng wu gong cheng xue bao* = Chinese journal of biotechnology 34, 1809-1822.
- Little NS, Elkins BH, Mullen RM, Perera OP, Parys KA, Allen KC and Boykin DL, 2019. Differences between two populations of bollworm, *Helicoverpa zea* (Lepidoptera: Noctuidae), with variable measurements of laboratory susceptibilities to Bt toxins exposed to non-Bt and Bt cottons in large field cages. *Plos One* 14, 16.
- Liu YB, Luo ZL, Zhao YM and Xiao NW, The selective feeding of cotton bollworms (*Helicoverpa armigera*) on transgenic and non-transgenic cotton leaves from consecutive cultivation fields. *International Journal of Pest Management* 6.
- Liu C, Zhang D, Wang Z, Chen L, Li G and Liang G, 2018. Resistance, and cross-resistance, of *Helicoverpa armigera* to different Bt proteins. *Chinese Journal of Applied Entomology* 55, 55-60.
- Liu X, Cui X, Sun B, Chen L and Wang W, 2018. Breeding of conventional cotton variety 'Simian 6821'. *Acta Agriculturae Shanghai* 34, 79-84.
- Liu A, Huang XF, Gong LJ, Guo ZJ, Zhang YJ and Yang ZX, 2019. Characterization of immune-related PGRP gene expression and phenoloxidase activity in Cry1Ac-susceptible and -resistant *Plutella xylostella* (L.). *Pesticide Biochemistry and Physiology* 160, 79-86.
- Liu J, NanGong ZY, Zhang J, Song P, Tang Y, Gao Y and Wang QY, 2019. Expression and characterization of two chitinases with synergistic effect and antifungal activity from *Xenorhabdus nematophila*. *World Journal of Microbiology & Biotechnology* 35, 10.
- Liu J, Wang L, Zhou G, Gao S, Sun T, Liu J and Gao B, 2019. Midgut transcriptome analysis of *Clostera anachoretatreated* with lethal and sublethal Cry1Ac protoxin. *Archives of Insect Biochemistry and Physiology* e21638.
- Liu YM, Li YH, Chen XP, Song XY, Shen P and Peng YF, 2019. No detrimental effect of Bt maize pollen containing Cry1Ab/2Aj or Cry1Ac on adult green lacewings *Chrysoperla sinica* Tjeder. *Journal of Integrative Agriculture* 18, 893-899.
- Liu Z, Zhao D, Chang M, Zhang Y, Xu C, Lu X and Guo W, 2019. Gene cloning of *Hyphantria cunea* midgut aminopeptidase N and its binding characteristics with three *Bacillus thuringiensis* toxins. *Acta Sericologica Sinica* 24-31.
- Liu Z, Zhu Z and Zhang T, 2019. Development of Transgenic CryIA(c) + GNA Cotton Plants via Pollen-Tube Pathway Method Confers Resistance to *Helicoverpa armigera* and *Aphis gossypii* Glover. *Methods in molecular biology* (Clifton, NJ) 1902, 233-244.
- Lone SA, Malik A and Padaria JC, 2018. Molecular cloning and characterization of a novel vip3-type gene from *Bacillus thuringiensis* and evaluation of its toxicity against *Helicoverpa armigera*. *Microbial Pathogenesis* 114, 464-469.
- Luo J, Zhang S, Zhu X, Ji J, Zhang K, Wang C, Zhang L, Wang L and Cui J, 2018. Effect of nacl-stressed *Bacillus thuringiensis* (Bt) cotton on the feeding behaviors and nutritional parameters of *Helicoverpa armigera*. *Plos One* 13, e0198570.
- Luong TTA, Zalucki MP, Perkins LE and Downes SJ, 2018. Feeding behaviour and survival of *Bacillus thuringiensis*-resistant and *Bacillus thuringiensis*- susceptible larvae of *Helicoverpa armigera* (Lepidoptera: Noctuidae) exposed to a diet with *Bacillus thuringiensis* toxin. *Austral Entomology* 57, 1-8.
- Luz PMC, Specht A, Paula-Moraes SV, Malaquias JV, Ferreira LFM, Otanasio PN and Diniz IR, 2019. Owlet moths (Lepidoptera: Noctuoidea) associated with Bt and non-Bt soybean in the brazilian savanna. *Brazilian Journal of Biology* 79, 248-256.
- Lv J, Zhang X, Gao TT, Cui TT, Peng Q, Zhang J and Song FP, 2019. Effect of the spoIIID

- mutation on mother cell lysis in *Bacillus thuringiensis*. *Applied Microbiology and Biotechnology* 103, 4103-4112.
- Ma W and Zhang T, 2019. Next-Generation Transgenic Cotton: Pyramiding RNAi with Bt Counters Insect Resistance. *Methods in molecular biology* (Clifton, NJ) 1902, 245-256.
- Ma YM, Zhang JF, Xiao YT, Yang YC, Liu CX, Peng R, Yang YB, Bravo A, Soberon M and Liu KY, 2019. The Cadherin Cry1Ac Binding-Region is Necessary for the Cooperative Effect with ABCC2 Transporter Enhancing Insecticidal Activity of *Bacillus thuringiensis* Cry1Ac Toxin. *Toxins* 11, 18.
- Majumder S, Sarkar C, Saha P, Gotyal BS, Satpathy S, Datta K and Datta SK, 2018. Bt Jute Expressing Fused delta-Endotoxin Cry1Ab/Ac for Resistance to Lepidopteran Pests. *Frontiers in Plant Science* 8, 14.
- Maniraj R, Karthik K, Shweta S, Vinutha T, Vandna R, Debasis P and Rohini S, 2019. Molecular interaction-based exploration of the broad spectrum efficacy of a *Bacillus thuringiensis* insecticidal chimeric protein, Cry1AcF. *Toxins* 11, 143.
- Manoj K, Yusuf MA, Manisha N and Manoj K, 2018. An update on genetic modification of chickpea for increased yield and stress tolerance. *Molecular Biotechnology* 60, 651-663.
- Marques LH, Santos AC, Castro BA, Moscardini VF, Rosseto J, Silva O and Babcock JM, 2019. Assessing the Efficacy of *Bacillus thuringiensis* (Bt) Pyramided Proteins Cry1F, Cry1A.105, Cry2Ab2, and Vip3Aa20 Expressed in Bt Maize Against Lepidopteran Pests in Brazil. *Journal of Economic Entomology* 112, 803-811.
- Mathew LG, Ponnuraj J, Mallappa B, Chowdary LR, Zhang JW, Tay WT, Walsh TK, Gordon KHJ, Heckel DG, Downes S, Carriere Y, Li XC, Tabashnik BE and Fabrick JA, 2018. ABC transporter mis-splicing associated with resistance to Bt toxin Cry2Ab in laboratory- and field-selected pink bollworm. *Scientific Reports* 8, 15.
- McPherson K, Lorenz G, Taillon N, Plummer A, Bateman N, Thrash B, Black J, Cato A, McCullars L and Pace J, 2018. Comparison of Bollgard II and Bollgard II Xtend cotton cultivars for control of cotton bollworm, *Helicoverpa zea* (Boddie), in the mid-South. *Research Series - Arkansas Agricultural Experiment Station* 64-67.
- Meissle M and Romeis J, 2018. Transfer of Cry1Ac and Cry2Ab proteins from genetically engineered Bt cotton to herbivores and predators. *Insect Science* 25, 823-832.
- Mendoza-Almanza G, Rocha-Zavaleta L, Aguilar-Zacarias C, Ayala-Lujan J and Olmos J, 2019. Cry1A Proteins are Cytotoxic to HeLa but not to SiHa Cervical Cancer Cells. *Current Pharmaceutical Biotechnology* 20, 1018-1027.
- Menon R, Sarao NK and Pathak M, 2018. In planta *Agrobacterium*-MEDIATED GENETIC TRANSFORMATION IN OKRA {*Abelmoschus esculentus* (L.) Moench}. *Applied Biological Research* 20, 221-227.
- Mirzaei S, Dezhsetan S and Tohidfar M, 2018. Stacking of cry1Ab and Chitinase Genes in Commercial Cotton Varieties through Crossing. *Journal of Agricultural Science and Technology* 20, 1259-1268.
- Morshita M, 2019. High-dose/Refuge Strategy for Insect Resistance to Bt Crops. *Japanese Journal of Applied Entomology and Zoology* 63, 29-38.
- Muraro DS, Garlet CG, Godoy DN, Cossa GE, Rodrigues GLD, Stacke RF, Medeiros SLP, Guedes JVC and Bernardi O, 2019. Laboratory and field survival of *Spodoptera frugiperda* (Lepidoptera: Noctuidae) on Bt and non-Bt maize and its susceptibility to insecticides. *Pest Management Science* 75, 2202-2210.
- Naegeli H, Birch AN, Casacuberta J, De Schrijver A, Gralak MA, Guerche P, Jones H, Manachini B, Messean A, Nielsen EE, Nogue F, Robaglia C, Rostoks N, Sweet J,

- Tebbe C, Visioli F, Wal JM, Alvarez F, Ardizzone M, Paraskevopoulos K, Broll H, Devos Y, Dumont AF, Ruiz JAG, Lanzoni A, Neri FM, Olaru I, Papadopoulou N and O EPGM, 2018. Assessment of genetically modified maize 4114 for food and feed uses, under Regulation (EC) No 1829/2003 (application EFSA-GMO-NL-2014-123). *Efsa Journal* 16, 25.
- Naegeli H, Birch AN, Casacuberta J, De Schrijver A, Gralak MA, Guerche P, Jones H, Manachini B, Messean A, Nielsen EE, Nogue F, Robaglia C, Rostoks N, Sweet J, Tebbe C, Visioli F, Wal JM, Broll H, Gennaro A, Neri FM, Paraskevopoulos K and Modified EPG, 2018. Assessment of genetically modified cotton GHB614 x LLCotton25 x MON 15985 for food and feed uses, under Regulation (EC) No 1829/2003 (application EFSA-GMO-NL-2011-94). *Efsa Journal* 16, 27.
- Naik VCB, Kumbhare S, Kranthi S, Satija U and Kranthi KR, 2018. Field-evolved resistance of pink bollworm, *Pectinophora gossypiella* (Saunders) (Lepidoptera: Gelechiidae), to transgenic *Bacillus thuringiensis* (Bt) cotton expressing crystal 1Ac (Cry1Ac) and Cry2Ab in India. *Pest Management Science* 74, 2544-2554.
- Nava-Camberos U, Avila-Rodriguez V, Maltos-Buendias J, Garcia-Hernandez JL and Martinez-Carrillo JL, 2018. Populations and Damages of Insect Pests in Conventional and Bt Cotton in the Comarca Lagunera, Mexico. *Southwestern Entomologist* 43, 985-993.
- Nazir MS, Malik TA, Shakeel A and Ahmad JN, 2019. Potential resistance of okra leaf Bt cotton against insect pests. *Applied Ecology and Environmental Research* 17, 5465-5469.
- Niu Y, Head GP, Price PA and Huang FN, 2018. Inheritance and fitness costs of Cry1A.105 resistance in two strains of *Spodoptera frugiperda* (JE Smith). *Crop Protection* 110, 229-235.
- Olivi BM, Gore J, Musser FM, Catchot AL and Cook DR, 2019. Impact of Simulated Corn Earworm (Lepidoptera: Noctuidae) Kernel Feeding on Field Corn Yield. *Journal of Economic Entomology* 112, 2193-2198.
- Osorio-Almanza L, Burbano-Figueroa O and Martinez-Reina A, 2018. Technical feasibility of genetically engineered cotton varieties expressing Cry proteins against *Anthonomus grandis* in the Sinu Valley, Colombia
- Factibilidad tecnica de variedades de algodon expresando proteinas Cry toxicas contra *Anthonomus grandis* en el Valle del Sinu, Colombia. *Revista Ciencia y Agricultura* 15, 47-60.
- Palinkas Z, Zalai M, Szenasi A, Dorner Z, Kiss J, North S, Woodward G and Balog A, 2018. Arthropods dataset from different genetically modified maize events and associated controls. *Scientific Data* 5, 6.
- Pan JG, Lv X, Jin DC, Bai ZH, Qi HY, Zhang HX and Zhuang GQ, 2019. Developmental stage has a greater effect than Cry1Ac expression in transgenic cotton on the phyllosphere mycobiome. *Canadian Journal of Microbiology* 65, 116-125.
- Pan Y, Dong Y, Wang RX and Yang MS, 2019. Generation of a promising universal RNAi vector system to control plant pests. *Acta Physiologiae Plantarum* 41, 12.
- Pande R, Shah V and Verma P, 2019. First report on identification of volatiles from egg and larval frass of Indian strain of the American bollworm *Helicoverpa armigera* (Hubner). *African Entomology* 27, 403-409.
- Pandey SP, Singh AP, Srivastava S, Chandrashekar K and Sane AP, 2019. A strong early acting wound-inducible promoter, RbPCD1pro, activates cryIAC expression within minutes of wounding to impart efficient protection against insects. *Plant Biotechnology Journal* 17, 1458-1470.

-
- Panwar BS, Kaur J, Kumar P and Kaur S, 2018. A novel cry52Ca1 gene from an Indian *Bacillus thuringiensis* isolate is toxic to *Helicoverpa armigera* (cotton boll worm). *Journal of Invertebrate Pathology* 159, 137-140.
- Park D, Choi IY and Kim NS, Detection of mPing mobilization in transgenic rice plants. *Genes & Genomics* 8.
- Paulo PD, Fadini MAM, Dominiquini AB, Mendes SM and Marinho CGS, 2018. Cry protein in the predatory mite *Neoseiulus californicus* and spider mite *Tetranychus urticae* prey fed with transgenic maize. *Brazilian Journal of Biology* 78, 91-93.
- Peng Q, Yu QY and Song FP, 2019. Expression of cry genes in *Bacillus thuringiensis* biotechnology. *Applied Microbiology and Biotechnology* 103, 1617-1626.
- Pinos D, Martinez-Solis M, Herrero S, Ferre J and Hernandez-Martinez P, 2019. The *Spodoptera exigua* ABCC2 Acts as a Cry1A Receptor Independently of its Nucleotide Binding Domain II. *Toxins* 11, 13.
- Prodhan MZH, Shirale DK, Islam MZ, Hossain MJ, Paranjape V and Shelton AM, 2019. Susceptibility of Field Populations of Eggplant Fruit and Shoot Borer (*Leucinodes orbonalis* Guenee) to Cry1Ac, the Protein Expressed in Bt Eggplant (*Solanum melongena* L.) in Bangladesh. *Insects* 10, 9.
- Qamar Z, Tariq M, Rehman T, Iqbal MS, Sarwar MB, Sharif MN, Hassan Z, Ahmad A, Zahra A, Latif A, Rashid B, Zaidi MA, Tabassum B, Hassan S, Baksh A, Javaid M, Akram S, Azam S, Naz F, Ahmed S, Bajwa KS, Awan MF, Shahid N, Ali A, Riaz S, Bashir B, Sadiq K, Kokab QU, Yousaf I, Farooq AM, Javed MA, Rahman ZU, Saleem MZ, Yasmin A, Bhatti MU, Arif U, Bashir K, Jamal A, Butt SJ, Arif A, Ahmad I, Rao AQ, Haider MS, Malik TH and Nasir IA, 2019. Trackable CEMB-Klean Cotton Transgenic Technology: Affordable Climate Neutral Agri-biotech Industrialization for Developing Countries. *Advancements in Life Sciences* 6, 131-138.
- Qian ZY, Zhang SJ, Zhang L, Zhang J, Liu YH, Zhou QH, Jiang SQ and Li SF, 2018. Subchronic toxicity study in rats evaluating genetically modified DAS-81419-2 soybean. *Regulatory Toxicology and Pharmacology* 96, 48-56.
- Qin D, Liu XY, Miceli C, Zhang Q and Wang PW, 2019. Soybean plants expressing the *Bacillus thuringiensis* cry8-like gene show resistance to *Holotrichia parallela*. *Bmc Biotechnology* 19, 12.
- Qiu L, Sun Y, Jiang Z, Yang P, Liu H, Zhou H, Wang X, Zhang W, Lin Y and Ma W, 2019. The midgut V-ATPase subunit A gene is associated with toxicity to crystal 2Aa and crystal 1Ca-expressing transgenic rice in *Chilo suppressalis*. *Insect Molecular Biology* 28, 520-527.
- Qiu XF, Lu XQ, Ren XM, Li R, Wu BB, Yang SS, Qi LL, Mo XT, Ding XZ, Xia LQ and Sun YJ, 2019. Solubility enhancement of Cry2Aa crystal through carboxy-terminal extension and synergism between the chimeric protein and Cry1Ac. *Applied Microbiology and Biotechnology* 103, 2243-2250.
- Rao VS, 2018. Herbicide resistant biotech crops and their import to Indian agriculture. *Indian Journal of Weed Science* 50, 223-238.
- Raszyk TJ, Suh CPC, Dickens CM and Sword GA, Genome-wide markers reveal temporal instability of local population genetic structure in the cotton fleahopper, *Pseudatomoscelis seriatus* (Hemiptera: Miridae). *Pest Management Science* 9.
- Reay-Jones FRF, 2019. Pest Status and Management of Corn Earworm (Lepidoptera: Noctuidae) in Field Corn in the United States. *Journal of Integrated Pest Management* 10, 9.

- Rehana A, Baloch MJ, Baloch GM and Qamaruddin C, 2018. Combining ability estimates for yield and fibre quality traits in Bt and non-Bt upland cotton genotypes. *Pure and Applied Biology* 7, 389-399.
- Reisig DD, Huseth AS, Bacheler JS, Aghaee MA, Braswell L, Burrack HJ, Flanders K, Greene JK, Herbert DA, Jacobson A, Paula-Moraes SV, Roberts P and Taylor SV, 2018. Long-Term Empirical and Observational Evidence of Practical *Helicoverpa zea* Resistance to Cotton With Pyramided Bt Toxins. *Journal of Economic Entomology* 111, 1824-1833.
- Reisig DD and Kurtz R, 2018. Bt Resistance Implications for *Helicoverpa zea* (Lepidoptera: Noctuidae) Insecticide Resistance Management in the United States. *Environmental Entomology* 47, 1357-1364.
- Rendon D, Taylor PW, Wilder SM and Whitehouse MEA, 2019. Does prey encounter and nutrient content affect prey selection in wolf spiders inhabiting Bt cotton fields? *Plos One* 14, 15.
- Reyaz AL, Balakrishnan N and Udayasuriyan V, 2019. Genome sequencing of *Bacillus thuringiensis* isolate T414 toxic to pink bollworm (*Pectinophora gossypiella* Saunders) and its insecticidal genes. *Microbial Pathogenesis* 134, 6.
- Rivero-Borja M, Rodriguez-Maciel JC, Urzua Gutierrez JA, Silva-Aguayo G, Chandrasena DI, Felix-Bermudez NC and Storer NP, 2019. Baseline of Susceptibility to the Cry1F Protein in Mexican Populations of Fall Armyworm. *Journal of Economic Entomology*.
- Rocha-Munive MG, Soberon M, Castaneda S, Niaves E, Scheinvar E, Eguiarte LE, Mota-Sanchez D, Rosales-Robles E, Nava-Camberos U, Martinez-Carrillo JL, Blanco CA, Bravo A and Souza V, 2018. Evaluation of the Impact of Genetically Modified Cotton After 20 Years of Cultivation in Mexico. *Frontiers in Bioengineering and Biotechnology* 6, 12.
- Rodrigues-Silva N, Canuto AF, Oliveira DF, Teixeira AF, Santos-Amaya OF, Picanco MC and Pereira EJG, 2019. Negative cross-resistance between structurally different *Bacillus thuringiensis* toxins may favor resistance management of soybean looper in transgenic Bt cultivars. *Scientific Reports* 9, 9.
- Romeis J, Naranjo SE, Meissle M and Shelton AM, 2019. Genetically engineered crops help support conservation biological control. *Biological Control* 130, 136-154.
- Roy-Barman S, Raut RA, Sarkar A, Sabnam N, Chakraborty S and Saha P, 2018. RECENT ADVANCES IN THE DEVELOPMENT OF TRANSGENIC CROP PLANTS, BIOSAFETY ASPECTS, AND FUTURE PERSPECTIVES. Apple Acad Press Inc, Oakville, 271-411
- Rubio-Infante N, Ilhuicatz-Alvarado D, Torres-Martinez M, Reyes-Grajeda JP, Nava-Acosta R, Gonzalez-Gonzalez E and Moreno-Fierros L, 2018. Cover Image, Volume 119, Number 1, January 2018. *Journal of Cellular Biochemistry* 119, i.
- Rupula K, Kosuri T, Gul MZ, Sharma B and Beedu SR, 2019. Immuno-analytical method development for detection of transgenic Cry1Ac protein and its validation. *Journal of the Science of Food and Agriculture* 99, 6903-6910.
- Sahin B, Gomis-Cebolla J, Gunes H and Ferre J, 2018. Characterization of *Bacillus thuringiensis* isolates by their insecticidal activity and their production of Cry and Vip3 proteins. *Plos One* 13, 18.
- Saini RP, Raman V, Dhandapani G, Malhotra EV, Sreevathsa R, Kumar PA, Sharma TR and Pattanayak D, 2018. Silencing of HaAce1 gene by host-delivered artificial microRNA disrupts growth and development of *Helicoverpa armigera*. *Plos One* 13, 16.

- Saleem MJ, Arshad M, Ahmed S and Sahi ST, 2019. VARIATION IN SUSCEPTIBILITY OF *Helicoverpa armigera* (LEPIDOPTERA: NOCTUIDAE) TO CRY1AC TOXIN. Pakistan Journal of Agricultural Sciences 56, 415-420.
- Saleh H, Abdelrazak A, Elsayed A, El-Shishtawy H and Osman Y, 2018. Optimizing production of a biopesticide protectant by black yeast. Egyptian Journal of Biological Pest Control 28, (6 September 2018).
- Salisu IB, Shahid AA, Yaqoob A, Rao AQ and Husnain T, 2019. Effect of dietary supplementation of recombinant Cry and Cp4 epsps proteins on haematological indices of growing rabbits. Journal of Animal Physiology and Animal Nutrition 103, 305-316.
- Schunemann R, Roggia S, Muraro DS, Knaak N and Fiuza LM, 2018. Insecticidal potential of *Bacillus thuringiensis* for the biological control of neotropical brown stink bug. Entomologia Experimentalis Et Applicata 166, 131-138.
- Seide VE, Bernardes RC, Pereira EJG and Lima MAP, 2018. Glyphosate is lethal and Cry toxins alter the development of the stingless bee *Melipona quadrifasciata*. Environmental Pollution 243, 1854-1860.
- Shahid AA, Salisu IB, Yaqoob A, Rao AQ, Ullah I and Husnain T, 2019. Assessing the fate of recombinant plant DNA in rabbit's tissues fed genetically modified cotton. Journal of Animal Physiology and Animal Nutrition.
- Shahid MI, Arshad M, ul Hasan M and Khan MA, 2019. Efficacy of Cry1Ac toxin from *Bacillus thuringiensis* against the beet armyworm, *Spodoptera exigua* (Hubner) (Lepidoptera: Noctuidae). Egyptian Journal of Biological Pest Control 29, 5.
- Shelton AM, Hossain MJ, Paranjape V, Azad AK, Rahman ML, Khan A, Prodhan MZH, Rashid MA, Majumder R, Hossain MA, Hussain SS, Huesing JE and McCandless L, 2018. Bt Eggplant Project in Bangladesh: History, Present Status, and Future Direction. Frontiers in Bioengineering and Biotechnology 6, 6.
- Shelton AM, Hossain MJ, Paranjape V, Prodhan MZH, Azad AK, Majumder R, Sarwer SH and Hossain MA, 2019. Bt Brinjal in Bangladesh: The First Genetically Engineered Food Crop in a Developing Country. Cold Spring Harbor Perspectives in Biology 11, 13.
- Shen X, Wang Y, Zhang Y, Guo W, Jiao Y and Zhou X, 2018. Overexpression of the wild soybean R2R3-MYB transcription factor GsMYB15 enhances resistance to salt stress and *Helicoverpa armigera* in transgenic *Arabidopsis*. International Journal of Molecular Sciences 19, 3958.
- Shera PS, Karmakar P, Sharma S and Sangha KS, 2018. Impact of Bt cotton expressing single (Cry1Ac) and dual toxins (Cry1Ac and Cry2Ab) on the fitness of the predator *Chrysoperla zastrowi sillemi* (Esben-Petersen): prey-mediated tri-trophic analysis. Egyptian Journal of Biological Pest Control 28, 7.
- Shukla M, Al-Busaidi KT, Trivedi M and Tiwari RK, 2018. Status of research, regulations and challenges for genetically modified crops in India. GM crops & food 9, 173-188.
- Siddiqui HA, Asif M, Asad S, Naqvi RZ, Ajaz S, Umer N, Anjum N, Rouf I, Sarwar M, Arshad M, Amin I, Saeed M, Mukhtar Z, Bashir A and Mansoor S, 2019. Development and evaluation of double gene transgenic cotton lines expressing Cry toxins for protection against chewing insect pests. Scientific Reports 9, 7.
- Silva LB, Maggioni K, Ferreira RH, Silva AF, Pavan BE and Lopes GN, 2019. Survival and nutritional indexes of *Spodoptera frugiperda* (J.E. Smith, 1797) (Lepidoptera: Noctuidae) maintained in Bt maize for five generations. Revista Brasileira De Ciencias Agrarias-Agraria 14, 8.

- Singh S, Kumar NR, Maniraj R, Lakshmikanth R, Rao KYS, Muralimohan N, Arulprakash T, Karthik K, Shashibhushan NB, Vinutha T, Pattanayak D, Dash PK, Kumar PA and Sreevathsa R, 2018. Expression of Cry2Aa, a *Bacillus thuringiensis* insecticidal protein in transgenic pigeon pea confers resistance to gram pod borer, *Helicoverpa armigera*. *Scientific Reports* 8, 12.
- Sivamani E, Nalapalli S, Prairie A, Bradley D, Richbourg L, Strebe T, Liebler T, Wang DL and Que QD, 2019. A study on optimization of pat gene expression cassette for maize transformation. *Molecular Biology Reports* 46, 3009-3017.
- Smith JL, Baute TS, Sebright MM, Schaafsma AW and DiFonzo CD, 2018. Establishment of *Striacosta albicosta* (Lepidoptera: Noctuidae) as a Primary Pest of Corn in the Great Lakes Region. *Journal of Economic Entomology* 111, 1732-1744.
- Smith JL, Farhan Y and Schaafsma AW, 2019. Practical Resistance of *Ostrinia nubilalis* (Lepidoptera: Crambidae) to Cry1F *Bacillus thuringiensis* maize discovered in Nova Scotia, Canada. *Scientific Reports* 9, 18247.
- Song YY, Liu RY, Wang MF, Liu MQ, Liu XH, Ge F and Chen FJ, Effects of transgenic Bt rice lines with single Cry1Ab and fused Cry1Ab/Cry1Ac on the abundance dynamics and community diversity of soil mites. *Archives of Agronomy and Soil Science* 14.
- Song P, Yang Y, Nangong Z, Guo L, Wang Z and Wang Q, 2018. Toxicity of *Bacillus thuringiensis* toxin proteins against *Athetis lepigone* larvae and histopathology of the midgut of the larvae. *Journal of Plant Protection* 45, 1349-1355.
- Song XY, Chang L, Reddy GVP, Zhang L, Fan CM and Wang BF, 2019. Use of Taxonomic and Trait-Based Approaches to Evaluate the Effects of Transgenic Cry1Ac Corn on the Community Characteristics of Soil Collembola. *Environmental Entomology* 48, 263-269.
- Sousa MFD, Fernandes MG and Guimaraes AJdS, 2019. Influence of Bt maize on diversity and composition of non-target arthropod species. *Journal of Agricultural Science (Toronto)* 11, 201-209.
- Souza CSF, Silveira LCP, Paula DP, Andow DA and Mendes SM, 2018. Transfer of Cry1F from Bt maize to eggs of resistant *Spodoptera frugiperda*. *Plos One* 13, 10.
- Souza CSF, Silveira LCP, Pitta RM, Waquil JM, Pereira EJG and Mendes SM, 2019. Response of field populations and Cry-resistant strains of fall armyworm to Bt maize hybrids and Bt-based bioinsecticides. *Crop Protection* 120, 1-6.
- Srikanth P, Mercy D, Ann M and Sam AM, 2019. Optimization of spacing and refuge strategy for improved Cr1Ac expression level in Bt cotton. *Research Journal of Biotechnology* 14, 45-52.
- Subbanna ARNS, Khan MS, Stanley J and Babu BK, 2018. Diversity of *Bacillus thuringiensis* isolates native to Uttarakhand Himalayas, India and their bioefficacy against selected insect pests. *Proceedings of the National Academy of Sciences India Section B, Biological Sciences* 88, 1489-1498.
- Tabashnik BE and Carriere Y, 2019. Global Patterns of Resistance to Bt Crops Highlighting Pink Bollworm in the United States, China, and India. *Journal of Economic Entomology* 112, 2513-2523.
- Takabatake R, Kagiya Y, Minegishi Y, Futo S, Soga K, Nakamura K, Kondo K, Mano J and Kitta K, 2018. Rapid Screening Detection of Genetically Modified Crops by Loop-Mediated Isothermal Amplification with a Lateral Flow Dipstick. *Journal of Agricultural and Food Chemistry* 66, 7839-7845.
- Takahashi TA, Nishimura G, Carneiro E and Foerster LA, 2019. First record of *Peridroma saucia* Hubner (Lepidoptera: Noctuidae) in transgenic soybeans. *Revista Brasileira*

- De Entomologia 63, 199-201.
- Tang H, Chen G, Chen FJ, Han LZ and Peng YF, 2018. Development and relative fitness of Cry1C resistance in *Chilo suppressalis*. *Pest Management Science* 74, 590-597.
- Tang QF, Yang ZP, Han RR, Zhang Y, Shen C and Wang J, 2019. No Effect of Bt-transgenic Rice on the Tritrophic Interaction of the Stored Rice, the Maize Weevil *Sitophilus Zeamais* and the Parasitoid Wasp *Theocolax elegans*. *Scientific Reports* 9, 7.
- Tariku Tesfaye E, 2019. Review on bio-intensive management of African bollworm, *Helicoverpa armigera* (Hub.): botanicals and semiochemicals perspectives. *African Journal of Agricultural Research* 14, 1-9.
- Tuyet Thi Anh L, Cribb BW, Downes SJ, Perkins LE and Zalucki MP, 2019. Stay or move: how Bt-susceptible *Helicoverpa armigera* neonates behave on Bt cotton plants. *Entomologia Experimentalis Et Applicata* 167, 868-879.
- Vassallo CN, Bunge FF, Signorini AM, Valverde-Garcia P, Rule D and Babcock J, 2019. Monitoring the Evolution of Resistance in *Spodoptera frugiperda* (Lepidoptera: Noctuidae) to the Cry1F Protein in Argentina. *Journal of Economic Entomology* 112, 1838-1844.
- Viktorov AG, 2019. Genetic Engineering-Based Modern Approaches to Enhance Crop Resistance to Pests. *Russian Journal of Plant Physiology* 66, 1-9.
- Visweshwar R, Akbar SMD, Sharma HC and Sreeramulu K, 2018. Influence of *Bacillus thuringiensis* toxins on the development and midgut proteases in different larval instars of *Helicoverpa armigera*. *Indian Journal of Entomology* 80, 960-970.
- Walters FS, Graser G, Burns A and Raybould A, 2018. When the Whole is Not Greater than the Sum of the Parts: A Critical Review of Laboratory Bioassay Effects Testing for Insecticidal Protein Interactions. *Environmental Entomology* 47, 484-497.
- Wang GY, Dong Y, Liu XJ, Yao GS, Yu XY and Yang MS, 2018. The Current Status and Development of Insect-Resistant Genetically Engineered Poplar in China. *Frontiers in Plant Science* 9, 15.
- Wang JX, Lin GF, Batool K, Zhang SQ, Chen MF, Xu J, Wu J, Jin L, Gelbic I, Xu L, Zhang LL and Guan X, 2018. Alimentary Tract Transcriptome Analysis of the Tea Geometrid, *Ectropis oblique* (Lepidoptera: Geometridae). *Journal of Economic Entomology* 111, 1411-1419.
- Wang XY, Liu QS, Meissle M, Peng YF, Wu KM, Romeis J and Li YH, 2018. Bt rice could provide ecological resistance against nontarget planthoppers. *Plant Biotechnology Journal* 16, 1748-1755.
- Wang Y, Wang M, Xiang S, Liu Q, Qiang S and Song X, 2018. Analysis on the event of global herbicide tolerant transgenic crops. *Journal of Agricultural Biotechnology* 26, 167-175.
- Wang YH, Chen JP, Gao J, Zhang X, Chen Y and Chen DH, 2018. Effect of soil salinity on insecticidal protein expression in flower buds of Bt cotton. *Ying yong sheng tai xue bao = The journal of applied ecology* 29, 3017-3023.
- Wang YH, Gao J, Sun MF, Chen JP, Zhang X, Chen Y and Chen DH, 2018. Impacts of soil salinity on Bt protein concentration in square of transgenic Bt cotton. *Plos One* 13, 13.
- Wang B, Fan C, Yin J, Wu F, Wang D and Song X, 2019. Effects of planting transgenic insect-resistant maize with cry1Ac gene Bt-799 on the composition structure of soil fauna. *Journal of Plant Protection* 46, 167-174.
- Wang BJ, Wang YN, Wei JZ, Liu C, Chen L, Khaing MM and Liang GM, 2019. Polycalin is involved in the action mechanism of Cry2Aa toxin in *Helicoverpa armigera*

- (Hubner). *Journal of Integrative Agriculture* 18, 627-635.
- Wang J, Xu D, Wang L, Cong S, Wan P, Lei C, Fabrick JA, Li X, Tabashnik BE and Wu K, 2019. Bt resistance alleles in field populations of pink bollworm from China: Similarities with the United States and decreased frequency from 2012 to 2015. *Pest Management Science*.
- Wang J, Zuo Y-Y, Li L-L, Wang H, Liu S-Y, Yang Y-H and Wu Y-D, 2019. Knockout of three aminopeptidase N genes does not affect susceptibility of *Helicoverpa armigera* larvae to *Bacillus thuringiensis* Cry1A and Cry2A toxins. *Insect Science*.
- Wang JD, Zhang JS, Guo YF, Chen LF, Wang FL, Huang MT, Gao SJ and Wang R, 2019. Molecular cloning, characterization, and expression profiling analysis of Cry toxin receptor genes from sugarcane shoot borer *Chilo infuscatellus* (Snellen). *Pesticide Biochemistry and Physiology* 157, 186-195.
- Wang L, Ma YM, Guo XQ, Wan P, Liu KY, Cong SB, Wang JT, Xu D, Xiao YT, Li XC, Tabashnik BE and Wu KM, 2019. Pink Bollworm Resistance to Bt Toxin Cry1Ac Associated with an Insertion in Cadherin Exon 20. *Toxins* 11, 13.
- Wang L, Wang JT, Ma YM, Wan P, Liu KY, Cong SB, Xiao YT, Xu D, Wu KM, Fabrick JA, Li XC and Tabashnik BE, 2019. Transposon insertion causes cadherin mis-splicing and confers resistance to Bt cotton in pink bollworm from China. *Scientific Reports* 9, 10.
- Wang PP, Ma JH, Head GP, Xia DP, Li J, Wang HQ, Yang ML, Xie ZM, Zalucki MP and Lu ZZ, 2019. Susceptibility of *Helicoverpa armigera* to two Bt toxins, Cry1Ac and Cry2Ab, in northwestern China: toward developing an IRM strategy. *Journal of Pest Science* 92, 923-931.
- Wang Y, Zhang X, Xie YJ, Wu AH, Zai XM and Liu XJ, 2019. High-affinity phage-displayed peptide as a recognition probe for the detection of Cry2Ad2-3. *International Journal of Biological Macromolecules* 137, 562-567.
- Wang YF, Wang JL, Fu XR, Nageotte JR, Silverman J, Bretsnyder EC, Chen DQ, Rydel TJ, Bean GJ, Li KS, Kraft E, Gowda A, Nance A, Moore RG, Pleau MJ, Milligan JS, Anderson HM, Asiimwe P, Evans A, Moar WJ, Martinelli S, Head GP, Haas JA, Baum JA, Yang F, Kerns DL and Jerga A, 2019. *Bacillus thuringiensis* Cry1Da₇ and Cry1B.868 Protein Interactions with Novel Receptors Allow Control of Resistant Fall Armyworms, *Spodoptera frugiperda* (JE Smith). *Applied and Environmental Microbiology* 85, 15.
- Wang YQ, Quan YD, Yang J, Shu CL, Wang ZY, Zhang J, Gatehouse AMR, Tabashnik BE and He KL, 2019. Evolution of Asian Corn Borer Resistance to Bt Toxins Used Singly or in Pairs. *Toxins* 11, 9.
- Wei JZ, Yang S, Chen L, Liu XG, Du MF, An SH and Liang GM, 2018. Transcriptomic Responses to Different Cry1Ac Selection Stresses in *Helicoverpa armigera*. *Frontiers in Physiology* 9, 17.
- Wei JZ, Zhang LL, Yang S, Xie BT, An SH and Liang GM, 2018. Assessment of the lethal and sublethal effects by spinetoram on cotton bollworm. *Plos One* 13, 11.
- Wei J, Zhang M, Liang G and Li X, 2019. Alkaline phosphatase 2 is a functional receptor of Cry1Ac but not Cry2Ab in *Helicoverpa zea*. *Insect Molecular Biology* 28, 372-379.
- Wei JZ, Zhang YL and An SH, 2019. The progress in insect cross-resistance among *Bacillus thuringiensis* toxins. *Archives of Insect Biochemistry and Physiology* 102, 15.
- Wu AJ, Chapman K, Sathischandra S, Massengill J, Araujo R, Soria M, Bugas M, Bishop Z, Haas C, Holliday B, Cisneros K, Lor J, Canez C, New S, Mackie S, Ghoshal D, Privalle L, Hunst P and Pallett K, 2019. GHB614 x T304-40 x GHB119 x COT102

- Cotton: Protein Expression Analyses of Field-Grown Samples. *Journal of Agricultural and Food Chemistry* 67, 275-281.
- Xiao YT and Wu KM, 2019. Recent progress on the interaction between insects and *Bacillus thuringiensis* crops. *Philosophical Transactions of the Royal Society B-Biological Sciences* 374, 15.
- Xie XW, Cui ZF, Wang YA, Wang YY, Cao FQ, Romeis J, Peng YF and Li YH, 2019. *Bacillus thuringiensis* Maize Expressing a Fusion Gene Cry1Ab/Cry1AcZM Does Not Harm Valued Pollen Feeders. *Toxins* 11, 13.
- Xing YJ, Qin ZF, Feng MY, Li AM, Zhang L, Wang Y, Dong XH, Zhang YX, Tan SQ and Shi WP, 2019. The impact of Bt maize expressing the Cry1Ac protein on non-target arthropods. *Environmental Science and Pollution Research* 26, 5814-5819.
- Xu C, Cheng JH, Lin HY, Lin CY, Gao JH and Shen ZC, 2018. Characterization of transgenic rice expressing fusion protein Cry1Ab/Vip3A for insect resistance. *Scientific Reports* 8, 8.
- Yang F, Chen M, Gowda A, Kerns DL and Huang FN, 2018. Possibly similar genetic basis of resistance to *Bacillus thuringiensis* Cry1Ab protein in 3 resistant colonies of the sugarcane borer collected from Louisiana, USA. *Insect Science* 25, 241-250.
- Yang J, Quan YD, Sivaprasath P, Shabbir MZ, Wang ZY, Ferre J and He KL, 2018. Insecticidal Activity and Synergistic Combinations of Ten Different Bt Toxins against *Mythimna separata* (Walker). *Toxins* 10, 10.
- Yang Y, Liang C, Meng Z, Chen Q, Luo S, Zhang R and Guo S, 2018. Construction of insect and herbicide resistant expression vector based on GR79 EPSPS screening marker and identification of resistance. *Journal of Agricultural Science and Technology (Beijing)* 20, 22-28.
- Yang F, Gonzalez JCS, Williams J, Cook DC, Gilreath RT and Kerns DL, 2019. Occurrence and Ear Damage of *Helicoverpa zea* on Transgenic *Bacillus thuringiensis* Maize in the Field in Texas, US and Its Susceptibility to Vip3A Protein. *Toxins* 11, 13.
- Yang XW, Chen WB, Song XZ, Ma XL, Cotto-Rivera RO, Kain W, Chu HN, Chen YR, Fei ZJ and Wang P, 2019. Mutation of ABC transporter ABCA2 confers resistance to Bt toxin Cry2Ab in *Trichoplusia ni*. *Insect Biochemistry and Molecular Biology* 112, 11.
- Yaqoob A, Shahid AA, Salisu IB, Azam S, Ahmed M and Rao AQ, 2019. Effects of Cry toxins on non-target soil bacteria during a 2-year follow up study. *Spanish Journal of Agricultural Research* 17, 8.
- Yu T, Li X, Coates BS, Zhang Q, Siegfried BD and Zhou X, 2018. microRNA profiling between *Bacillus thuringiensis* Cry1Ab-susceptible and -resistant European corn borer, *Ostrinia nubilalis* (Hubner). *Insect Molecular Biology* 27, 279-294.
- Zhang W, Lu YH, van der Werf W, Huang JK, Wu F, Zhou K, Deng XZ, Jiang YY, Wu KM and Rosegrant MW, 2018. Multidecadal, county-level analysis of the effects of land use, Bt cotton, and weather on cotton pests in China. *Proceedings of the National Academy of Sciences of the United States of America* 115, E7700-E7709.
- Zhang B, Guo W and Zhang T, 2019. Inheritance of Transgenes in Transgenic Bt Lines Resistance to *Helicoverpa armigera* in Upland Cotton. *Methods in molecular biology (Clifton, NJ)* 1902, 199-210.
- Zhang DD, Xiao YT, Chen WB, Lu YH and Wu KM, 2019. Field monitoring of *Helicoverpa armigera* (Lepidoptera: Noctuidae) Cry1Ac insecticidal protein resistance in China (2005-2017). *Pest Management Science* 75, 753-759.
- Zhang L, Lu G, Huang X, Guo H, Su X, Han L, Zhang Y, Qi Z, Xiao Y and Cheng H, 2019. Overexpression of the caryophyllene synthase gene GhTPS1 in cotton negatively

- affects multiple pests while attracts parasitoids. *Pest Management Science*.
- Zhang M, Wei JZ, Ni XZ, Zhang J, Jurat-Fuentes JL, Fabrick JA, Carriere Y, Tabashnik BE and Li XC, 2019. Decreased Cry1Ac activation by midgut proteases associated with Cry1Ac resistance in *Helicoverpa zea*. *Pest Management Science* 75, 1099-1106.
- Zhang MJ, Feng MC, Xiao LJ, Song XY, Guangwei D and Yang WD, 2019. Persistence of Cry1Ac Protein from Transgenic Bt Cotton Cultivation and Residue Returning in Fields and Its Effect on Functional Diversity of Soil Microbial Communities. *Pedosphere* 29, 114-122.
- Zhou D, Liu X, Gao S, Guo J, Su Y, Ling H, Wang C, Li Z, Xu L and Que Y, 2018. Foreign cry1Ac gene integration and endogenous borer stress-related genes synergistically improve insect resistance in sugarcane. *BMC Plant Biology* 18, 342.
- Zhou YW, Niu Y, Head GP, Price PA and Huang FN, 2018. Performance of Bt-susceptible and -heterozygous genotypes of *Spodoptera frugiperda* (JE Smith) possessing single- or dual-gene resistance alleles in sequential feedings of non-Bt and Cry1A.105/Cry2Ab2 maize leaf tissues. *Journal of Invertebrate Pathology* 159, 105-112.
- Zhou J, Guo Z, Kang S, Qin J, Gong L, Sun D, Guo L, Zhu L, Bai Y, Zhang Z, Zhou X and Zhang Y, 2019. Reduced expression of the P-glycoprotein gene PxABCB1 is linked to resistance to *Bacillus thuringiensis* Cry1Ac toxin in *Plutella xylostella* (L.). *Pest Management Science*.
- Zhou LQ, Alphey N, Walker AS, Travers LM, Morrison NI, Bonsall MB and Raymond B, 2019. The application of self-limiting transgenic insects in managing resistance in experimental metapopulations. *Journal of Applied Ecology* 56, 688-698.
- Zhou MY, Li YB, Cui Q, Abidallha E, Chen Y and Chen DH, 2019. Square Insecticidal Protein Concentration Relate to its Biomass in Bt Cotton. *Agronomy Journal* 111, 467-472.
- Zhu B, Sun X, Nie X, Liang P and Gao X, 2019. MicroRNA-998-3p contributes to Cry1Ac-resistance by targeting ABCC2 in lepidopteran insects. *Insect Biochemistry and Molecular Biology* 103283.
- Zhu CQ, Niu Y, Zhou YW, Guo JG, Head GP, Price PA, Wen XJ and Huang FN, 2019. Survival and effective dominance level of a Cry1A.105/Cry2Ab2-dual gene resistant population of *Spodoptera frugiperda* (JE Smith) on common pyramided Bt corn traits. *Crop Protection* 115, 84-91.
- Zubair M, Latif A, Rao AQ, Azam S, Shahid N, Samiullah TR, Yasmeen A, Shahid AA, Nasir IA and Husnain T, 2019. A Combinational Approach of Enhanced Methanol Production and Double Bt Genes for Broad Spectrum Insect Resistance in Transgenic Cotton. *Molecular Biotechnology* 61, 663-673.

Appendix 3. Publications screened for relevance based on the full text

Table 3.1. Report of all relevant publications retrieved after detailed assessment of full-text documents for relevance

Category of information/ data requirement(s)	Reference (Author, year, title, source)
None	Not applicable

Table 3.2. Report of publications excluded from the risk assessment after detailed assessment of full-text documents

Reference (Author, year, title, source)	Reason(s) for exclusion based on eligibility/inclusion criteria listed in Table 1
None	Not applicable

Table 3.3. Report of unobtainable/unclear publications

Reference (Author, year, title, source)	Description of (unsuccessful) methods used to try to obtain a copy of the publication
None	Not applicable