Curriculum vitae

Personal Information

First name and Family name	**Ayda Khorramnejad**
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Researcher Codes	SCOPUS Author ID 57202999733 ORCID orcid.org/0000-0003-1110-5791
Address	Via Ferrata 9- 27100, Pavia, Italy

Education

2016- 2018	**PhD** in *Biomedicine and Biotechnology* Department of Genetics. University of Valencia, Valencia, Spain Supervisors: Dr. Baltasar Escriche Soler, Dr. Yolanda Bel Cortes My Ph.D. was the first international joint supervision of a Doctoral Thesis at the UT and the first double title between UV and an Iranian University. I graduated on 18.Nov.2018 with the highest qualification as a 1st ranked student obtaining a 19.22 GPA out of 20 (UT) and excellent *cum laude* (UV).
2013 - 2018	**PhD** in *Agricultural Entomology – Biological Control* Department of Plant Protection, University of Tehran, Tehran, Iran Supervisors: Dr. Reza Talaei-Hassanloui, Dr. Vahid Hosseini-Naveh Thesis: Structural and functional diversity of *Bacillus thuringiensis* toxins on animal, plant and microbial cells.
2010 - 2013	**M.Sc.** in *Agricultural Entomology* Department of Plant Protection, University of Tehran, Tehran, Iran Supervisor: Dr. Reza Talaei-Hassanloui Thesis: Isolation and characterization of *Bacillus thuringiensis* isolates from host and different habitats and their virulence on diamondback moth, *Plutella xylostella* (Lep.: Plutellidae).
2006 - 2010	**B.Sc.** in *Plant Protection* Department of Plant Protection, University of Tehran, Tehran, Iran

Academic positions

Date	**Activity**	**Institute**
01/03/2023- present	Ricercatore RTD-A	Laboratory of Genomics and Biotechnology of Insects of Agriculture & Medical Importance. Department of Biology and Biotechnology. University of Pavia, Italy.
01/07/2021- 28/02/2023	Postdoctoral researcher	Laboratory of Genomics and Biotechnology of Insects of Agriculture & Medical Importance. Department of Biology and Biotechnology. University of Pavia, Italy.
20/09/2019-30/06/2021	Postdoctoral researcher	Laboratory of Biological Control of Pests. Department of Genetics. University of Valencia, Valencia, Spain.
10/01/2018- 30/05/2019	Teaching assistant	Department of Plant Protection University of Tehran, Tehran, Iran
04/02/2016-20/12/2017	Pre-doctoral researcher	Laboratory of Biological Control of Pests. Department of Genetics. University of Valencia, Valencia, Spain.
01/09/2008-15/03/2009	Research assistant	Laboratory of Biological Control of Pests Department of Plant Protection University of Tehran, Tehran, Iran

Teaching activity

Academic year	Course	Level	University
2018-2019	Biological Control of Pests	Master	University of Tehran
2018-2019	Insect Biotechnology	Master	University of Tehran
2018-2019	Insect Pathology	PhD	University of Tehran
2014-2015	Biological Control of Pests	Master	University of Tehran

Co-supervisions of M.Sc. students

Master Student: Lucia Foresto
University: University of Pavia *Department:* Biologia e Biotecnologie "L. Spallanzani"
Year: 2021-2022 *Qualification: cum laude*
Thesis title: "Comparison among sampling methods to assess non-indigenous species in ports and application of DNA barcoding to disentangle the identity of colonial ascidians".

Master Student: Shiva Haraji
University: University of Tehran *Facultat:* Agriculture and Natural Resources
Year: 2018-2019 *Qualification:* Maximum qualification
Thesis title: "Studying the anti-microbial peptides of *Ephestia kuehniella* (Lep.: Pyralidae) and *Zophobas morio* (Col.: Tenebrionidae) treated with *Beauveria bassiana* and *Bacillus thuringiensis*".

Master Student: Romina Bahrami
University: University of Pavia *Department:* Biologia e Biotecnologie "L. Spallanzani"
Year: 2021-2023 Master degree of Molecular Biology and Genetics
Thesis title: "Effect of *Bacillus thuringiensis* subsp. *israelensis* on fitness, microbiota, immune system and susceptibility of *Aedes albopictus* to CFAV".

Participation in funded research projects and grants

1. Research project entitled "The behavioural and genetic basis of thermos-adaptation in mosquitoes". Department of biology and biotechnology, University of Pavia, Italy. PI: Prof. Mariangela Bonizzoni. Duration of project: 2022-current. *Participation*: **Postdoctoral researcher**.
2. Research project ERC-Co NIRV_HOST_INT entitled "Population Genomics of coevolution between nonretroviral RNA viruses and their hosts". Department of biology and biotechnology, University of Pavia, Italy. PI: Prof. Mariangela Bonizzoni. Duration of project: 2021-2022. *Participation*: **Postdoctoral researcher**.
3. **RTI2018-095204-B-C21.** Desarrollo de un innovador insecticida-Bt altamente efectivo contra *Spodoptera exigua* (Lep; Noctuinae) y *Helicoverpa armigera* (Lep; Heliothinae). Funding: Ministerio de Ciencia, Innovación y Universidades. PI: Dr. Juan Ferré Manzanero and Dr. Baltasar Escriche Soler (Universitat de València). Duration of project: 2019-2021, 166.000,00, *Participation*: **Researcher** (2020-2021)

4. **CIP 7809-608/3/2.1;** Sweet Potato Action for Security and Health in Africa (SASHA). Funding: Bill and Melinda Gates Foundation (BMGF). PI: Dr. Baltasar Escriche Soler (Universitat de València), 01/07/2009-30/06/2021. 310.000 €. *Participation*: **Researcher** (2019-2021).
5. **AGL2015-70584-C2-1-R;** Desarrollo y aplicación de metodologías para la obtención de nuevos bioinsecticidas basados en *Bacillus thuringiensis*. Funding: Ministerio de Economía y Competitividad. PI: Dr. Juan Ferré Manzanero and Dr. Baltasar Escriche Soler (Universitat de València). 01/01/2016-30/06/2019. 170.000 €. *Participation*: **Researcher** (2016-2018).
6. **11665920902001;** Isolation, characterization, and toxicity of native *Bacillus thuringiensis* isolates from different hosts and habitats in Iran. Funding: Islamic Azad University of Iran. PI: Dr. Reza Talaei-Hassanloui (Department of Plant Protection, College of Agriculture and Natural Resources, University of Tehran, Iran), 2013-2016, 30,000,000 IRR, *Participation*: **Researcher** (2013-2015).

Congresses

1. **Khorramnejad A.,** Contreras C., Quaranta S., Gasmi L., Bonizzoni M. 2022. Investigating physiological differences between native and invasive strains of the arboviral vector *Aedes albopictus*. SIBE (Società Italiana di Biologia Evoluzionistica), 4-7 September 2022, Ancona, Italy (Invited speaker).
2. **Khorramnejad, A.,** Bel, Y., Talaei-Hassanloui, R., Escriche B. 2021. Is activation of *Bacillus thuringiensis* Cry1Ia proteins necessary for toxicity? The 53rd Meeting of the Society for Invertebrate Pathology, Virtual Meeting, 28th June – 2nd July 2021 (Invited speaker).
3. Andrés-Garrido, A., **Khorramnejad, A**., González-Martínez, R.M., Escriche, B. Cadherin fragment from *Spodoptera exigua* enhances Cry1A toxicity to *Grapholita molesta*. The 53rd Meeting of the Society for Invertebrate Pathology, Virtual Meeting, 28th June – 2nd July 2021.
4. **Khorramnejad, A.,** Bel, Y., Talaei-Hassanloui, R., Escriche, B. Cloning, molecular characterization, and insecticidal and cytocidal activity of *Bacillus thuringiensis* Cry1Ia38 wild type and mutant toxins. National Congress of Applied Entomology, 4-8 Nov. 2019, Madrid, Spain.
5. **Khorramnejad, A.,** Domínguez, M., Caballero, P., Escriche, B., Bel, Y. Is oligomerization an important step in toxicity of the *Bacillus thuringiensis* insecticidal protein Cry1Ia? The 52nd Meeting of the Society for Invertebrate Pathology, Valencia, Spain 28th July - 1st August 2019 (Invited speaker).
6. **Khorramnejad, A.,** Prentice, K., Vera-Velasco, N.M., Smagghe, G., Hernández-Martínez, P., Escriche, B. The *Bacillus thuringiensis* Cry37Aa protein is not necessary to mediate toxicity and binding of Cry23Aa protein on *Cylas puncticollis*. The 52nd Meeting of the Society for Invertebrate Pathology, Valencia, Spain 28th July - 1st August 2019.
7. **Khorramnejad, A.,** Talaei-Hassanloui, R., Hosseininaveh, V., Homayoonzadeh, M., Escriche, B., Bel, Y. Insect toxicity, antifungal activity, plant response and endophytic potential of an Iranian *Bacillus thuringiensis* strain tested on tomato plants. The 9th National Conference on Biological Control, Hamedan, Iran, 10-11 July, 2019 (Invited speaker).
8. **Khorramnejad, A.,** Talaei-Hassanloui, R., Bel, Y. and Escriche, B. Susceptibility of lepidopteran cell lines to *Bacillus thuringiensis* toxins. National Congress of Applied Entomology, 16-20 Oct. 2017, Logrono, Spain (Invited speaker).
9. **Khorramnejad, A**., Bel, Y., Hernández-Martínez, P., Talaei-Hassanloui, R. and Escriche, B. Insecticidal activity and cytotoxicity of *Bacillus thuringiensis* Cry1Ia protein. GMOs in

Integrated Plant Protection IOBC-WPRS meeting, 4-6 September 2017 in Ghent, Belgium (Invited speaker).

10. **Khoramnezhad, A.,** Talaei-Hassanloui, R. and Ghasemi-Kahrizeh, A. 2015. Relatedness of protein profile and toxicity of some Iranian *Bacillus thuringiensis* isolates to diamondback moth, *Plutella xylostella* (Lep., Plutellidae). Fifth Entomopathogens and Microbial Control Congress, 9-11 Sep. 2015, Ankara, Turkey (Poster Presentation).
11. **Khoramnezhad, A.** and Talaei-Hassanloui, R. The role of insect indigenous gut bacteria in pathogenicity of *Bacillus thuringiensis*: Indian meal moth, *Plodia interpunctella* larvae as a case study. Third National Meeting on Biological control in Agriculture and Natural Resources, 1-2 Feb. 2016, Ferdowsi University of Mashhad, Mashhad (Poster Presentation).
12. **Khoramnezhad, A.,** Talaei-Hassanloui, R. and Bandani, A. 2013. Evaluating the virulence of *Bacillus thuringiensis* strains isolated from host and different habitats on diamondback moth, *Plutella xylostella* (Lep.: Plutellidae). Conference of Biological Control in Agriculture and Natural Resources, University of Tehran, Karaj, Iran. 27-28 Aug. 2013 (Poster Presentation).

Scientific Awards

1. The First International Joint Supervision of Doctoral Thesis at the University of Tehran, Iran, (https://utcan.ut.ac.ir/en/news/7508/the-first-ph.d.-student-at-the-university-of-tehran-and-the-university-of-valencia-was-graduated), receiving excellent *cum laude* from both University of Tehran and University of Valencia (Nov. 2018).
2. Top student of Ph.D.: Rank 1, graduated 2018 obtaining 19.22 GPA out of 20, University of Tehran.
3. Student travel funding award for IOBC congress 2017, in Ghent, Belgium.
4. Receiving a scholarship from the Ministry of Science, Research and Technology in Iran for six months (2016) for sabbatical leave.
5. Best poster awards in Third National Meeting on Biological control in Agriculture and Natural Resources, 1-2 Feb. 2016, Ferdowsi University of Mashhad, Mashhad.
6. Top student of B.Sc.: Rank 1, graduated 2010, University of Tehran.
7. Top student of M.Sc.: Rank 1, graduated 2013, University of Tehran.

Other achievements and continuity

Scientific service. Since the end of my PhD, I served as reviewer for different journals such as *Insects*, *Biological Control*, *Pest Management Science*, *Toxins* and *Medical and Veterinary Entomology*.

***Scientific Committee*.** Main member of the poster assessment committee of the 9th National Conference on Biological Control, Hamedan, Iran, 10-11 July, 2019.

***Biotechnology Application*.** Establishment of a Bt strain as a Bt-based insecticide to be mass-produced by Green Biotechnology Company in Iran with the commercial name of Rouin-2®.

Workshops

2019	R Workshop; Scientific Analysis at the University of Tehran, Iran.
2015	Workshop on human and animal cell cultures in Iranian biological resource centre (IBRC).
2015	Workshop on insect life table presented by Prof. Chi in the University of Tehran, Iran.
2012	Workshop on writing and publishing a scientific paper in the Iranian biological resource centre, (IBRC), Tehran, Iran.
2011	Workshop on Molecular biology techniques in the Iranian biological resource centre, (IBRC).

Publication of Scientific Papers and Books

1. Talaei-Hasanloui, R., Bakhshaei, R., Hosseininaveh, V. and **Khorramnejad, A.** 2013. Effect of midgut proteolytic activity on susceptibility of lepidopteran larvae to *Bacillus thuringiensis* subsp. *kurstaki*. *Frontiers in Physiology* 4: 406 (1-6).
2. **Khoramnezhad A.,** Talaei-Hassanloui R. and Ghassemi-Kahrizeh A. 2016. Evaluating the virulence of *Bacillus thuringiensis* strains isolated from host and different habitats on diamondback moth, *Plutella xylostella* (Lep.:Plutellidae). *Biological Control of Pests and Plant Diseases* 4(2): 167-172.
3. Ghasemi-Kahrizeh, A., **Khoramnezhad, A.** and Talaei-Hassanloui, R. 2017. Isolation, characterization and toxicity of native *Bacillus thuringiensis* from host and different habits in Iran. *Journal of Plant Protection Research* 57(3): 217-223.
4. **Khorramnejad, A.,** Bel, Y., Hernández-Martínez, P., Talaei-Hassanloui, R. and Escriche, B. 2018. Insecticidal activity and cytotoxicity of *Bacillus thuringiensis* Cry1Ia protein. GMOs in Integrated Plant Protection IOBC-WPRS Bulletin. 131: 56-63.
5. **Khorramnejad, A.,** Talaei-Hassanloui, R., Hosseininaveh, V., Bel, Y. and Escriche, B. 2018. Characterization of new *Bacillus thuringiensis* strains from Iran, based on cytocidal and insecticidal activity, proteomic analysis and gene content. *BioControl* 63: 807-818.
6. **Khorramnejad, A.**, Escriche, B., Bel, Y. 2019. Obtencion de colecciones de *Bacillus thuringiensis* para el descubrimiento de nuevas cepas y nuevas proteinas con actividad insecticida. In: Tena A, Bielza P, Ferré J. (eds) Boletín de la Sociedad Española de Entomología Aplicada. SEEA, Madrid, pp. 41-46.
7. **Khorramnejad, A.,** Domínguez-Arrizabalaga, M., Caballero, P., Escriche B. and Bel Y. 2020. Study of the *Bacillus thuringiensis* Cry1Ia protein oligomerization promoted by midgut brush border membrane vesicles of Lepidopteran and Coleopteran insects, or cultured insect cells. *Toxins* 12:133.
8. Hernández-Martínez, P., **Khorramnejad, A.*,** Prentice, K., Vera-Velasco, N., Smagge, G. and Escriche, B**.** 2020. The independent biological activity of *Bacillus thuringiensis* Cry23Aa protein against *Cylas puncticollis. Frontiers in Microbiology* 11:1734. doi: 10.3389/fmicb.2020.01734 (Co-first author)
9. **Khorramnejad, A.,** Gomis-Cebolla, Q., Talaei-Hassanlouei, R., Bel, Y., and Escriche, B. 2020. Genomics and proteomics analyses revealed novel putative pesticidal proteins in a lepidopteran-toxic *Bacillus thuringiensis* strain. *Toxins* 12: 673.
10. Haraji, S., Talaei-Hassanloui, R., **Khorramnejad, A.,** Hosseini naveh, V. 2020. Non-cellular response of flour moth, *Ephestia kuehniella* challenged with *Bacillus thuringiensis* and *Beauveria bassiana*. Iranian Journal of Plant Protection Science. 9: 29-35. 10.22059/jbioc.2020.301344.290.

11. Ashjaei, Z., Talaei-Hassanloui, R., **Khorramnejad, A.,** Talebi Jahromi, K. 2021. Optimizing suspensibility, stability and virulence of commercial products of *Bacillus thuringiensis*. Iranian Journal of Plant Protection Science 52 (1), 81-89.
12. **Khorramnejad A.,** Karimi J., Jouzani G.S. (2021) Progress on the Bacterium *Bacillus thuringiensis* and Its Application Within the Biological Control Program in Iran. In: Karimi J., Madadi H. (eds) Biological Control of Insect and Mite Pests in Iran. Progress in Biological Control, vol 18. Springer, Cham. https://doi.org/10.1007/978-3-030-63990-7_10.
13. **Khorramnejad, A.**, Perdomo, H.D., Palatini, U., Bonizzoni, M., Gasmi, L. 2021. Cross Talk between Viruses and Insect Cells Cytoskeleton. *Viruses*, 13, 1658. https://doi.org/10.3390/v13081658.
14. **Khorramnejad, A.,** Bel, Y., Talaei-Hassanloui, R., Escriche, B. 2022. Activation of *Bacillus thuringiensis* Cry1I to a 50 kDa stable core impairs its full toxicity to *Ostrinia nubilalis*. *Applied Microbiology and Biotechnology*, 106(4), 1745-1758.
15. Torkaman, Z., Talaei-Hassanloui, R., **Khorramnejad, A.** and Pashaei, M.R., 2023. Effects of endophytism by Beauveria bassiana (Cordycipitaceae) on plant growth, Fusarium (Nectriaceae) disease, and Sunn pest Eurygaster integriceps (Hemiptera: Scutelleridae) in wheat (Poaceae). *The Canadian Entomologist*, *155*, p.e12.
16. Carlassara, M., **Khorramnejad, A.*,** Oker, H., Bahrami, R., Lozada-Chávez, A.N., Mancini, M.V., Quaranta, S., Body, M., Lahondère, C. and Bonizzoni, M. 2024. Population-specific responses to developmental temperature in the arboviral vector *Aedes albopictus*: Implications for climate change. Global Change Biology 30, no. 3 (2024): e17226. (Co-first author)
17. Cosme, L.V., Corley, M., Johnson, T., Severson, D.W., Yan, G., Wang, X., Beebe, N., Maynard, A., Bonizzoni, M., **Khorramnejad, A.** and Martins, A.J., 2024. A genotyping array for the globally invasive vector mosquito, *Aedes albopictus*. Parasites & Vectors, 17(1), p.106.

Research statement

My research studies during M.Sc. and PhD always dealt with insects, particularly insect physiology, fitness, biological and biotechnological control of insects of agriculture and medical importance, insect resistance mechanisms, immunity, and insect-microbe interactions from symbiosis to pathogenesis. Beside entomological subjects, I acquired great experiences in molecular biology and microbiological studies. My PhD dissertation dealt with *Bacillus thuringiensis* (Bt) as the most successful Gram-positive bacterium in the biological control of insects. I isolated and characterized 150 Bt isolates following the conventional molecular biology techniques, 16s rRNA sequence, gene content (PCR-based and whole-genome sequencing), protein profile, protein composition (LC-MS/MS analysis), the production of β-exotoxin, the anti-microbial activity, and toxicity to insects. I evaluated the spectrum of insecticidal and cytocidal activity of Bt against different insect species from different orders: Lepidoptera (Noctuidea, Pyralidae, Tortricidae and Crambidae), Diptera (*Drosophila melanogaster*, *Aedes albopictus*), Hymenoptera (*Trichogramma embryophagum*), Coleoptera (*Callosobruchus maculatus* and *Cylas puncticollis*) and Blattodea (*Blattella germanica*). During my first postdoctoral position at the University of Valencia, I studied the molecular and physiological mechanisms of the insecticidal activity of Bt toxins, how they affect the insect microbiota, and eventually insect resistance mechanisms to Bt.

Following this first postdoc, I joined University of Pavia as a postdoctoral researcher in the Dep. of Biology and Biotechnology. My main focus is to study the physiological and life history traits associated with thermal adaptation of *Aedes albopictus* in order to determine whether these adaptations are supported by heritable genetic modifications. Within the same context, I am studying the effect of hot temperature regime on fitness and microbiota composition of *Ae. albopictus* and *Ae. koreicus*. In addition, I am investigating the effect of long-term exposure to Bt on fitness, physiology, microbiota

and immune system of *Ae. albopictus*. Throughout the previous few years, I could acquire the following expertise:

- Rearing insects and performing bioassays
- Fitness assays (mating behaviors, fecundity, and fertility)
- Insect physiology, Immune system, Gut microbiota
- Insect cell line; maintaining insect cell lines and performing viability and cytotoxicity assays, Working with BTI-Tn-5B1-4, Hi5, RP-HzGUT-AW1, SeUCR, Sf21 insect cell lines
- *Bacillus thuringiensis* characterization, mode of action and resistance mechanism
- Molecular biology techniques: DNA and RNA extraction, PCR, RT-PCR, Gene cloning, Site-directed mutagenesis, Western blot and Dot blot
- Biochemistry techniques: Protein expression and purification, Iodine and biotin labelling of Proteins, Enzymology (APN and ALP activity)