

## Curriculum Vitae

### Kyeongnam Kim

80, Daehak-ro, Buk-gu, Kyungpook National University (KNU), Daegu, Republic of Korea 41566	- Position: Research Prof. - Email: kn1188@knu.ac.kr - Cell: (082) 10-9336-1188
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#### Education

<b>Ph.D.</b>	<b>Kyungpook National University, Daegu, Republic of Korea</b>	<b>2018-2022</b>
	<ul style="list-style-type: none"> <li>· Department of Applied Biosciences – Environmental Toxicology</li> <li>· Dissertation title: Toxicological mechanisms of methyl bromide and its alternative fumigants (phosphine and ethyl formate) against <i>Arabidopsis thaliana</i> and quarantine insect pests using multi-omics approaches</li> </ul>	
<b>M.S.</b>	<b>Kyungpook National University, Daegu, Republic of Korea</b>	<b>2016-2018</b>
	<ul style="list-style-type: none"> <li>· Department of Applied Biosciences – Environmental Toxicology</li> <li>· Thesis title: Heart Developmental Toxicity by Carbon Black Waste generated from Oil Refinery on Zebrafish Embryos (<i>Danio rerio</i>): Combined Toxicity on Heart Function by Nickel and Vanadium</li> </ul>	
<b>B.S.</b>	<b>Kyungpook National University, Daegu, Republic of Korea</b>	<b>2011-2014</b>
	<ul style="list-style-type: none"> <li>· School of Applied Biosciences – Molecular Microbiology</li> </ul>	

#### Position Held

Research Prof.	Institute of Quality and Safety Evaluation of Agricultural Products, Kyungpook National University, Daegu, Republic of Korea	2023.03-Present
Post-Doc.	Institute of Quality and Safety Evaluation of Agricultural Products, Kyungpook National University, Daegu, Republic of Korea	2022.09-2023.02
Post-Doc.	Department of Applied Biosciences (BK21 program), Kyungpook National University, Daegu, Republic of Korea	2022.03-2022.08
Instructor	School of Applied Biosciences, Kyungpook National University, Daegu, Republic of Korea	2022.03-2023.02

#### Research Interests

- Environmental toxicology and ecotoxicology
- Mechanisms of action of chemicals on plants and pests using Multi-omics
- Environmental impact of agrochemicals and developing sustainable pest management strategies

#### Publications

- †Authors equally contributed to this paper as first authors. / Students under my direct mentoring are underlined
- 1. **Kim, K.**, Kim, D, Kwon, T.H., Lee, B.H., Lee, S.E., Effective phytosanitary treatment for export of Oriental melons (*Cucumis melo* var L.) using ethyl formate and modified atmosphere packaging to control *Trialeurodes vaporariorum* (Hemiptera: Aleyrodidae). **2023 Insects**.
- 2. Kim, Y.<sup>†</sup>, Jeon, H.J.<sup>†</sup>, **Kim, K.**, Kim, C., Moon, J.K., Hwang, K.W., Lee, S.E. Enantioselective effect of trifloxystrobin in early-stage zebrafish (*Danio rerio*) embryos: Cardiac abnormalities impacted by E,E-trifloxystrobin enantiomer. **2023 Environ Pollut** 327, 121537.
- 3. Jeon, H.J.<sup>†</sup>, Cho, Y.<sup>†</sup>, **Kim, K.**, Kim, C., Lee, S.E. Combined toxicity of 3,5,6-trichloro-2-pyridinol and 2-(bromomethyl) naphthalene in the early stages of zebrafish (*Danio rerio*) embryos: Abnormal

- heart development at lower concentrations via differential expression of heart forming-related genes. **2023** *Environ Pollut* 325, 121450.
4. Jeon, H.J.<sup>†</sup>, **Kim, K.<sup>†</sup>**, Kim, C., Lee, S.E. Antimelanogenic effects of curcumin and its dimethoxy derivatives: Mechanistic investigation using B16F10 melanoma cells and zebrafish (*Danio rerio*) embryos. **2023** *Foods* 12, 926.
  5. Cho, Y.<sup>†</sup>, Jeon, H. J.<sup>†</sup>, **Kim, K.** Kim, C., Lee, S.E. Developmental toxicity of a pymetrozine photo-metabolite, 3-pyridinecarboxaldehyde, in zebrafish (*Danio rerio*) embryos: Abnormal cardiac development and occurrence of heart dysfunction via differential expression of heart formation-related genes. **2023** *Ecotox Environ Safe* 253, 114654.
  6. **Kim, K.<sup>†</sup>**, Kim, C.<sup>†</sup>, Yoo, J., Kim, J.R., Kim, Y.H., Lee, S.E. Phosphine gas in the dark induces severe phytotoxicity in *Arabidopsis thaliana* by increasing a hypoxia stress response and disrupting the energy metabolism: Transcriptomic approaches. **2023** *J Hazard Mater* 43, 130141.
  7. Jeon, H.J., **Kim, K.**, Kim, C., Cho, Y., Kwon, T.H., Lee, B.H., Lee, S.E., Residual evaluation of ethyl formate in soil and crops after fumigation in green house. **2022**. *Korean J. Environ. Biol.* 40(3): 316-324.
  8. Park, J., Kim, Y., Jeon, H. J., **Kim, K.**, Kim, C., Lee, S., Son, J., Lee, S.E. Acute and developmental toxic effects of mono-halogenated and halomethyl naphthalenes on zebrafish (*Danio rerio*) embryos: Cardiac malformation after 2-bromomethyl naphthalene exposure. **2022**. *Environ Pollut* 297, 118786.
  9. **Kim, K.**, Kim, C., Park, J., Yoo, J., Kim, W., Jeon, H.J., Kim, J.R., Lee, S.E., Reduction effects of N-acetyl-L -cysteine, L -glutathione, and indole-3-acetic acid on phytotoxicity generated by methyl bromide fumigation- in a model plant *Arabidopsis thaliana*. **2021**. *Korean J. Environ. Biol.* 39(3): 354-361.
  10. Park, J., Kim, C., Jeon, H.J., **Kim, K.**, Kim, M.J., Moon, J. K., Lee, S.E. Developmental toxicity of 3-phenoxybenzoic acid (3-PBA) and endosulfan sulfate derived from insecticidal active ingredients: Abnormal heart formation by 3-PBA in zebrafish embryos. **2021** *Ecotoxicol Environ Saf* 224, 112689.
  11. **Kim, K.**, Park, M. G., Lee, Y. H., Jeon, H. J., Kwon, T. H., Kim, C., Park, J., Lee, B. H., Yang, J. O., Lee, S. E. Synergistic Effects and Toxic Mechanism of Phosphine with Ethyl Formate against Citrus Mealybug (*Planococcus citri*). **2021** *Appl Sci-Basel* 11 (21).
  12. Choe, H., Kim, M. J., Jeon, H. J., **Kim, K.**, Kim, C., Park, J., Shin, J., Lee, S. R., Lee, S. E. Acute toxicity of the insecticide EPN upon zebrafish (*Danio rerio*) embryos and its related adverse effects: Verification of abnormal cardiac development and seizure-like events. **2021** *Ecotox Environ Safe* 222.
  13. **Kim, K.<sup>†</sup>**, Kim, C.<sup>†</sup>, Park, J., Jeon, H. J., Park, Y. J., Kim, Y. H.; Yang, J. O., Lee, S. E., Transcriptomic evaluation on methyl bromide-induced phytotoxicity in *Arabidopsis thaliana* and its mode of phytotoxic action via the occurrence of reactive oxygen species and uneven distribution of auxin hormones. **2021** *J Hazard Mater* 419, 126419.
  14. **Kim, K.**, Lee, S. E. Combined toxicity of dimethyl sulfoxide (DMSO) and vanadium towards zebrafish embryos (*Danio rerio*): Unexpected synergistic effect by DMSO. **2021** *Chemosphere* 270, 129405.
  15. Kim, C., Choe, H., Park, J., Kim, G., **Kim, K.**, Jeon, H. J., Moon, J. K., Kim, M. J., Lee, S. E.. Molecular mechanisms of developmental toxicities of azoxystrobin and pyraclostrobin toward zebrafish (*Danio rerio*) embryos: Visualization of abnormal development using two transgenic lines. **2021** *Environ Pollut* 270.
  16. Jeon, H. J., **Kim, K.**, Kim, C., Kim, M. J., Kim, T. O., Lee, S. E. Molecular Mechanisms of Anti-Melanogenic Gedunin Derived from Neem Tree (*Azadirachta indica*) Using B16F10 Mouse Melanoma Cells and Early-Stage Zebrafish. **2021** *Plants-Basel* 10 (2).
  17. Kim, Y. C., Lee, S. R., Jeon, H. J., **Kim, K.**, Kim, M. J., Choi, S. D., Lee, S. E. Acute toxicities of fluorene, fluorene-1-carboxylic acid, and fluorene-9-carboxylic acid on zebrafish embryos (*Danio rerio*): Molecular mechanisms of developmental toxicities of fluorene-1-carboxylic acid. **2020** *Chemosphere* 260.

18. Lee, H.K.<sup>†</sup>, **Kim, K.**<sup>†</sup>, Lee, J., Lee, J., Lee, J., Kim, S., Lee, S.E., Kim, J.H. Targeted toxicometabolomics of endosulfan sulfate in adult zebrafish (*Danio rerio*) using GC-MS/MS in multiple reaction monitoring mode. **2020** *J Hazard Mater* 389, 122056.
19. **Kim, K.**<sup>†</sup>, Yang, J. O.<sup>†</sup>, Sung, J.Y., Lee, J.Y., Park, J. S., Lee, H.S., Lee, B.H., Ren, Y., Lee, D.W., Lee, S.E. Minimization of energy transduction confers resistance to phosphine in the rice weevil, *Sitophilus oryzae*. **2019** *Sci Rep* 2019, 9 (1).
20. Jeon, H.J., **Kim, K.**, Kim, Y.D., Lee, S.E. Naturally occurring Piper plant amides potential in agricultural and pharmaceutical industries: perspectives of piperine and piperlongumine. **2019** *Appl Biol Chem* 62 (1), 63.
21. **Kim, K.**, Lee, Y. H., Kim, G., Lee, B.H., Yang, J.O., Lee, S.E., Ethyl formate and phosphine fumigations on the two-spotted spider mite, *Tetranychus urticae* and their biochemical responses. **2019** *Appl Biol Chem* 62 (1).
22. **Kim, K.**, Wang, C.H., Ok, Y. S., Lee, S.E. Heart developmental toxicity by carbon black waste generated from oil refinery on zebrafish embryos (*Danio rerio*): Combined toxicity on heart function by nickel and vanadium. **2019** *J Hazard Mater* 363, 127-137.
23. **Kim, K.**, Park, J., Yang, J.O, Lee, S.E., Proteomic Evaluation of Insecticidal Action of Phosphine on Green Peach Aphids, *Myzus persicae*. **2018** *Appl Sci* 8 (10), 1764.
24. **Kim, K.**, Jeon, H.J., Choi, S.D., Tsang, D. C. W., Oleszczuk, P., Ok, Y. S., Lee, H.S., Lee, S.E. Combined toxicity of endosulfan and phenanthrene mixtures and induced molecular changes in adult Zebrafish (*Danio rerio*). **2018** *Chemosphere* 194, 30-41.
25. Nam, T.H., Kim, L., Jeon, H.J., **Kim, K.**, Ok, Y.S., Choi, S.D., Lee, S.E. Biomarkers indicate mixture toxicities of fluorene and phenanthrene with endosulfan toward earthworm (*Eisenia fetida*). **2017** *Environ Geochem Health* 39 (2), 307-317.
26. Kim, L., Jeon, J.W., Son, J.Y., Park, M.K., Kim, C.S., Jeon, H.J., Nam, T.H., **Kim, K.**, Park, B.J., Choi, S.D., Lee, S.E., Concentration and distribution of polychlorinated biphenyls in rice paddy soils. **2017** *Appl Biol Chem* 60 (2), 191-196.

## Publications – In preparation

1. **Kim, K.**<sup>†</sup>, Kim, C.<sup>†</sup>, Kwon, T.H., Jeon, H.J., Cho, Y., Kim. Y., Kim, D., Lee, Y., Lee, B.H., Lee, S. E. Residue-Free Ethyl Formate Fumigation for Efficient Control of Two Major Agricultural Pests in three major cucurbit crops with Reduced Phytotoxicity. *Pest Manag Sci* (**Under review**)
2. **Kim, K.**<sup>†</sup>, Kim, D.<sup>†</sup>, Kwon, S.H., Roh, G.H., Lee, S., Lee, B.H., Lee, S.E., A Novel Ethyl Formate Fumigation Strategy for Managing Yellow Tea Thrips (*Scirtothrips dorsalis*) in Greenhouse Cultivated Mangoes and Post-Harvest Fruits. *Insects* (**Under review**)
3. Kim, D.<sup>†</sup>, **Kim, K.**<sup>†</sup>, Jeon, H.J., Lee, S. E. Phosphine resistance in the red flour beetle (*Tribolium castaneum*) involved chitin biosynthesis: Micro-CT approaches. **2023** *J Hazard Mater* (**In preparation**)
4. **Kim, K.**, Kim, D., Jeon, H.J., Jeong, M., Lee, S. E. Phosphine resistant biomarkers of the red flour beetle (*Tribolium castaneum*) based on transcriptomics with machine learning approaches. **2023** *J Pest Sci* (**In preparation**)

## Patents

1	Development of reducing chemicals and conditions on phosphine-induced phytotoxicity (10-2023-0036575)	2023.03
2	A method for reducing the weakening of imported seedlings by ethyl formate and a composition for fumigation control of quarantine pests (10-2023-0036574)	2023.03
2	A method for reducing damage to agricultural crops by ethyl formate and a protective agent for agricultural crops (10-2022-0182608)	2022
3	Method for reducing phytotoxicity of plant by methyl bromide (10-2022-0055032)	2022
4	Biomarkers for diagnosing phosphine resistance-induced insects ( <b>Granted patent</b> (4th Apr.2021): 10-2240047)	2018

5	Biomarker composition for discriminating remaining endosulfan or determining toxicity of endosulfan comprising wax ester ( <b>Granted patent</b> (3th Mar.2021): 10-2225307)	2017
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## Experimental skills

- 1 Molecular biology techniques
  - DNA/RNA isolation, PCR (RT-PCR, qRT-PCR), Western blot, and Enzyme assays
  - Gene cloning, Microinjection (in *Tribolium castaneum* and *Danio rerio*), and Genotyping (T7E1 and CAPS methods)
- 2 Analytical instruments
  - LC: HPLC-DAD (and FLD), LC-MS/MS, and LC-Q-TOF-MS
  - GC: GC-MS, GC-FID (and ECD, NPD)
- 3 Fumigation methods: Methyl bromide, Ethyl formate, and Phosphine
- 4 Bioinformatics: R and Python for Multi-Omics analysis  
(Transcriptomics, proteomics, lipidomics, and metabolomics)
- 5 Organism breeding skills
  - **Insects:** *Tribolium castaneum*, *Sitophilus oryzae*, *Rhyzopertha dominica*, *Galleria mellonella*, *Myzus persicae*, *Planococcus citri*, and so on
  - **Plants:** *Arabidopsis thaliana*, and various crops
  - **Other organisms.:** Cell lines (HepG2, AML12, C2C12, and B16F10), *Danio rerio*, and *Eisenia fetida*
- 6 Design tools: GraphPad Prism, Adobe Illustrator, Photoshop, and Premiere

## Grants, Fellowship, and Awards

1.	<b>(Current grant)</b> Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education - <b>Project Title:</b> Development of mutant models of the red flour beetle ( <i>Tribolium castaneum</i> ) for assessing phosphine resistance mechanism and control	\$89698.84 (/2 years)	2022.09- 2024.08
2.	The Excellent Prize of Oral Presentation in General session in KSAE	\$80	2023
2.	The Top prize in the 4th BK21 Participating Education Group Performance Forum Excellent Performance Presentation Competition (Bioscience & Engineering Department)	\$3737.45	2022
3.	The Top Prize in KNU Alumni Association Academic Award	\$3737.45	2022
4.	The Top Prize in Participating Graduate Students Performance Sharing Presentation in the 4th BK21 Program	\$768.90	2022
5.	4th BK21 Government Scholarship Program: Doctor course	\$38810.0	2018-2022
6.	The Top Prize of the Corteva award competition (Insecticide resistance: Mechanism and management) in KSAE	\$768.90	2019
7.	3rd BK21 Government Scholarship Program: Master course	\$11044.8	2016-2018
8.	Excellent Paper Presentation Award in 3rd BK21 Program		2018
9.	Excellent Paper Presentation Award in KSABC		2017
10.	KNU Challenge Scholarship: Undergraduate Student (Tuition)	\$84328.0	2012-2014
11.	KNU Challenge Scholarship – Global program (Australia)	\$1917.5	2013
12.	KNU Challenge Scholarship – Global program (Philippine)	\$1917.5	2012
13.	KNU Undergraduate Student Tutoring Service Scholarship	\$920.40	2013-2014

## Conferences & Symposia

1	Spring International Conference of Korean Society of Applied Entomology (KSAE) - <b>Excellence prize</b>	Oral	Apr., 2023
2	Fall International Conference of Korean Society of Applied Entomology (KSAE) - <b>Invited</b>	Oral	Oct., 2022
3	The 77th Annual Meeting of the Korean Association of Biological Sciences - <b>Invited</b>	Oral	Aug., 2022

4	International Symposium and Annual Meeting of the KSABC – Young Scientist Presentation - <i>Invited</i>	Oral	June, 2022
5	4 <sup>th</sup> BK21 Participating Education Group Performance Forum - Excellent Performance Presentation Competition - <i>Top prize</i>	Oral	Feb., 2022
6	4 <sup>th</sup> BK21 program symposium - <i>Top prize</i>	Oral	Feb., 2022
7	Fall International Conference of KSAE - Corteva award competition (Insecticide resistance: Mechanism and management) - <i>Top prize</i>	Oral	Oct., 2019
8	The 2nd International Conference on Biological Waste as Resource 2017 (BWR2017) in Hongkong	Oral	May, 2019
9	International Symposium and Annual Meeting of the KSABC – Graduate Student Presentation	Oral	June, 2018
10	International Symposium and Annual Meeting of the KSABC – Graduate Student Presentation ( <b>Excellent Paper</b> )	Oral	June, 2017

### Invited and contributed lectures

1	Theory and practice of analytical instrumentation (GC-MS and HPLC), Plant Quarantine Technology Center, Animal and Plant Quarantine Agency, Gimcheon 39660, Republic of Korea	Aug., 2022
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### Teaching experience

1	School of Applied Biosciences, Kyungpook National University, Daegu, Republic of Korea <ul style="list-style-type: none"> <li>· Agricultural Food Hazardous Substances Informatics</li> <li>· Analytical Organic Chemistry Experiment</li> <li>· Functional Cosmetics based on Natural Product</li> </ul>	2022-present
2	Facilitator Workshop using Design Thinking, Design Thinking Community (DTC), Daegu, Republic of Korea	2015-2016
3	Youth Community Workshop for Career Exploration, Daegu, Republic of Korea	2014-2016

### Journal review and Editorial service – peer reviewer

1	Journal of Asia-Pacific Entomology (Elsevier)
2	Science of The Total Environment (Elsevier)

### References

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<b>Dong-Woo Lee</b> , Ph.D. (Collaborator) Yonsei University, Seoul, Republic of Korea	leehicam@yonsei.ac.kr
<b>Qing X. Li</b> , Ph.D. (Collaborator) University of Hawaii at Manoa, Honolulu, HI, USA	qingl@hawaii.edu