

## Supplementary information

### A critical review on the toxicity regulation and ecological risks of zinc oxide nanoparticles to plants

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**Table S1** Basic information about the retrieved scientific papers.

No.	PT	Author	Title	Type	Conference Title	ISO Source Abbreviation	Year Published	DOI
1	J	Shen, Meimei; Liu, Weitao; Zeb, Aurang; Lian, Jiapan; Wu, Jiani; Lin, Maohong	Bioaccumulation and phytotoxicity of ZnO nanoparticles in soil-grown <i>Brassica chinensis</i> L. and potential risks	Article		J. Environ. Manage.	2022	10.1016/j.jenvman.2022.114454
2	J	Du, Jia; Tang, Junhong; Xu, Shaodan; Ge, Jingyuan; Dong, Yuwei; Li, Huanxuan; Jin, Meiqing	ZnO nanoparticles: Recent advances in ecotoxicity and risk assessment	Review		Drug Chem. Toxicol.	2020	10.1080/01480545.2018.1508218
3	J	Obrador, Ana; Gonzalez, Demetrio; Almendros, Patricia; Garcia-Gomez, Concepcion; Fernandez, Maria Dolores	Assessment of phytotoxicity and behavior of 1-year-aged Zn in soil from ZnO nanoparticles, bulk ZnO, and Zn sulfate in different soil-plant cropping systems: From biofortification to toxicity	Article		J. Soil Sci. Plant Nutr.	2022	10.1007/s42729-021-00640-8
4	J	Wang, Fayuan; Jing, Xinxin; Adams, Catharine A.; Shi, Zhaoyong; Sun, Yuhuan	Decreased ZnO nanoparticle phytotoxicity to maize by arbuscular mycorrhizal fungus and organic phosphorus	Article		Environ. Sci. Pollut. Res.	2018	10.1007/s11356-018-2452-x
5	J	Singh, Divya; Kumar, Arun	Quantification of metal uptake in <i>Spinacia oleracea</i> irrigated with water containing a mixture of CuO and ZnO nanoparticles	Article		Chemosphere	2020	10.1016/j.chemosphere.2019.125239
6	J	Liu, Xueqin; Wang, Fayuan; Shi, Zhaoyong; Tong, Ruijian; Shi, Xiaojun	Bioavailability of Zn in ZnO nanoparticle-spiked soil and the implications to maize plants	Article		J. Nanopart. Res.	2015	10.1007/s11051-015-2989-2
7	J	Rajput, Vishnu; Minkina, Tatiana; Sushkova, Svetlana; Behal, Arvind; Maksimov, Alexey; Blicharska, Eliza; Ghazaryan, Karen; Movsesyan, Hasmik; Barsova, Natalia	ZnO and CuO nanoparticles: A threat to soil organisms, plants, and human health	Article; Proceedings Paper	European-Geosciences-Union (EGU) Conference on Soil Contamination and Human Health - Advances and Problems of Risk	Environ. Geochem. Health	2020	10.1007/s10653-019-00317-3

					Assessment			
8	J	Karmous, Ines; Tlahig, Samir; Loumerem, Mohamed; Lachiheb, Belgacem; Bouhamda, Talel; Mabrouk, Mahmoud; Debouba, Mohamed; Chaoui, Abdelilah	Assessment of the risks of copper- and zinc oxide-based nanoparticles used in <i>Vigna radiata</i> L. culture on food quality, human nutrition and health	Article		Environ. Geochem. Health	2022	10.1007/s10653-021-01162-z
9	J	Ji, Hongting; Guo, Zhi; Wang, Guodong; Wang, Xin; Liu, Hongjiang	Effect of ZnO and CuO nanoparticles on the growth, nutrient absorption, and potential health risk of the seasonal vegetable <i>Medicago polymorpha</i> L.	Article		PeerJ	2022	10.7717/peerj.14038
10	J	Garcia-Gomez, Concepcion; Garcia, Sandra; Francisca Obrador, Ana; Gonzalez, Demetrio; Babin, Mar; Dolores Fernandez, Maria	Effects of aged ZnO NPs and soil type on Zn availability, accumulation and toxicity to pea and beet in a greenhouse experiment	Article		Ecotox. Environ. Safe.	2018	10.1016/j.ecoenv.2018.05.019
11	J	Doria-Manzur, Alonso; Sharifan, Hamidreza; Tejada-Benitez, Lesly	Application of zinc oxide nanoparticles to promote remediation of nickel by <i>Sorghum bicolor</i> : Metal ecotoxic potency and plant response	Article		Int. J. Phytoremediat.	2023	10.1080/15226514.2022.2060934
12	J	Li, Mengqi; Ahammedl, Golam J.; Li, Caixia; Bao, Xiao; Yu, Jingquan; Huang, Chunlei; Yin, Hanqin; Zhou, Jie	Brassinosteroid ameliorates zinc oxide nanoparticles-induced oxidative stress by improving antioxidant potential and redox homeostasis in tomato seedling	Article		Front. Plant Sci.	2016	10.3389/fpls.2016.00615
13	J	Oscar, Bianca Vicente Costa; Melegari, Silvia Pedroso; Vicentini, Denice Schulz; Simioni, Carmen; Ouriques, Luciane Cristina; Puerari, Rodrigo Costa; Matias, William Gerson	Toxicological effects of pure and amine-functionalized ZnO nanorods on <i>Daphnia magna</i> and <i>Lactuca sativa</i>	Article		Environ. Sci.: Nano	2023	10.1039/d2en00622g
14	J	Hou, Jing; Wu, Yazhou; Li, Xin; Wei, Benben; Li, Shiguo; Wang, Xiangke	Toxic effects of different types of zinc oxide nanoparticles on algae, plants, invertebrates, vertebrates and microorganisms	Review		Chemosphere	2018	10.1016/j.chemosphere.2017.11.077
15	C	Samart, Sutichai; Chutipaijit, Sutee	Growth of pigmented rice ( <i>Oryza sativa</i> L. cv. Riceberry) exposed to ZnO nanoparticles	Proceedings Paper	1st International Conference of the Materials-	Mater. Today-Proc.	2019	10.1016/j.matpr.2019.06.246

					Research-Society-of-Thailand (MRS-Thailand)			
16	J	Song, Uham; Kim, Jieun	Zinc oxide nanoparticles: A potential micronutrient fertilizer for horticultural crops with little toxicity	Article		Hortic. Environ. Biotechnol.	2020	10.1007/s13580-020-00244-8
17	J	Basahi, M. A.	Effects of zinc oxide nanoparticles on germination and seedling establishment of pea ( <i>Pisum sativum</i> ) and beans ( <i>Phaseolus vulgaris</i> )	Article; Early Access		Appl. Ecol. Environ. Res.	2022	10.15666/aeer/2005_38933909
18	J	Fellmann, Sebastian; Eichert, Thomas	Acute effects of engineered nanoparticles on the growth and gas exchange of <i>Zea mays</i> L.-what are the underlying causes?	Article		Water Air Soil Pollut.	2017	10.1007/s11270-017-3364-y
19	J	Sheteiwy, Mohamed Salah; Shaghaleh, Hiba; Hamoud, Yousef Alhaj; Holford, Paul; Shao, Hongbo; Qi, Weicong; Hashmi, Muhammad Zaffar; Wu, Tianow	Zinc oxide nanoparticles: Potential effects on soil properties, crop production, food processing, and food quality	Review		Environ. Sci. Pollut. Res.	2021	10.1007/s11356-021-14542-w
20	J	Iziy, Elham; Majd, Ahmad; Vaezi-Kakhki, Mohammad Reza; Nejadstattari, Taher; Noureini, Sakineh Kazemi	Effects of zinc oxide nanoparticles on enzymatic and nonenzymatic antioxidant content, germination, and biochemical and ultrastructural cell characteristics of <i>Portulaca oleracea</i> L.	Article		Acta Soc. Bot. Pol.	2019	10.5586/asbp.3639
21	J	Wang, Fayuan; Liu, Xueqin; Shi, Zhaoyong; Tong, Ruijian; Adams, Catharine A.; Shi, Xiaojun	Arbuscular mycorrhizae alleviate negative effects of zinc oxide nanoparticle and zinc accumulation in maize plants - A soil microcosm experiment	Article		Chemosphere	2016	10.1016/j.chemosphere.2015.12.076
22	J	Garcia-Gomez, C.; Babin, M.; Obrador, A.; Alvarez, J. M.; Fernandez, M. D.	Integrating ecotoxicity and chemical approaches to compare the effects of ZnO nanoparticles, ZnO bulk, and ZnCl <sub>2</sub> on plants and microorganisms in a natural soil	Article		Environ. Sci. Pollut. Res.	2015	10.1007/s11356-015-4867-y
23	J	Wang, Fayuan; Adams, Catharine A.; Shi, Zhaoyong; Sun, Yuhuan	Combined effects of ZnO NPs and Cd on sweet sorghum as influenced by an arbuscular mycorrhizal fungus	Article		Chemosphere	2018	10.1016/j.chemosphere.2018.06.099
24	J	Singh, Ajey; Singh, N. B.; Afzal, Shadma; Singh, Tanu;	Zinc oxide nanoparticles: A review of their biological synthesis, antimicrobial	Review		J. Mater. Sci.	2018	10.1007/s10853-017-1544-1

		Hussain, Imtiyaz	activity, uptake, translocation and biotransformation in plants					
25	J	Dogaroglu, Zeynep Gorkem; Ece, Fatma; Ciftci, Buva Nur; Yildirimcan, Saadet; Erat, Selma	Evaluation of stress factor on wheat ( <i>Triticum aestivum</i> ): The effect of ZnO and Ni-doped ZnO nanoparticles	Article		Toxicol Environ. Chem.	2021	10.1080/02772248.2021.1923714
26	J	Pullagurala, Venkata L. Reddy; Adisa, Ishaq O.; Rawat, Swati; Kim, Bojeong; Barrios, Ana C.; Medina-Velo, Ilyya A.; Hernandez-Viezcas, Jose A.; Peralta-Videa, Jose R.; Gardea-Torresdey, Jorge L.	Finding the conditions for the beneficial use of ZnO nanoparticles towards plants-A review	Review		Environ. Pollut.	2018	10.1016/j.envpol.2018.06.036
27	J	Tao, Han; Hu, Songshen; Xia, Chuchu; Wang, Mengyu; Wang, Tonglin; Zeng, Wei; Li, Yubo; Chen, Hao; Zheng, Jirong; Wang, Qiaomei	Involvement of glucosinolates in the resistance to zinc oxide nanoparticle-induced toxicity and growth inhibition in <i>Arabidopsis</i>	Article		Environ. Sci.: Process Impacts	2021	10.1039/d1em00134e
28	J	Bandyopadhyay, Susmita; Plascencia-Villa, German; Mukherjee, Arnab; Rico, Cyren M.; Jose-Yacamán, Miguel; Peralta-Videa, Jose R.; Gardea-Torresdey, Jorge L.	Comparative phytotoxicity of ZnO NPs, bulk ZnO, and ionic zinc onto the alfalfa plants symbiotically associated with <i>Sinorhizobium meliloti</i> in soil	Article		Sci. Total Environ.	2015	10.1016/j.scitotenv.2015.02.014
29	J	Ahmed, Bilal; Rizvi, Asfa; Zaidi, Almas; Khan, Mohammad Saghir; Musarrat, Javed	Understanding the phyto-interaction of heavy metal oxide bulk and nanoparticles: Evaluation of seed germination, growth, bioaccumulation, and metallothionein production	Article		RSC Adv.	2019	10.1039/c8ra09305a
30	J	Dong, Mengyuan; Sun, Rong; Yang, Qianhui; Zhang, Lantian; Yong, Yangying; Fang, Yunxia; Zhang, Xian; Zhang, Xiaoqin; Xue, Dawei	Phenotype, physiology, and gene expression of barley seedlings in response to nano zinc oxide stress	Article		Phyton-Int. J. Exp. Bot.	2021	10.32604/phyton.2021.017465
31	J	Song, Uhram; Lee, Sunryung	Phytotoxicity and accumulation of zinc oxide nanoparticles on the aquatic plants <i>Hydrilla verticillata</i> and <i>Phragmites Australis</i> : Leaf-type-	Article		Environ. Sci. Pollut. Res.	2016	10.1007/s11356-015-5982-5

			dependent responses					
32	J	Mukherjee, Arnab; Peralta-Videa, Jose R.; Bandyopadhyay, Susmita; Rico, Cyren M.; Zhao, Lijuan; Gardea-Torresdey, Jorge L.	Physiological effects of nanoparticulate ZnO in green peas ( <i>Pisum sativum</i> L.) cultivated in soil	Article		Metallomics	2014	10.1039/c3mt00064h
33	J	Sabir, Sumera; Zahoor, Muhammad Asif; Waseem, Muhammad; Siddique, Muhammad Hussain; Shafique, Muhammad; Imran, Muhammad; Hayat, Sumreen; Malik, Imran Riaz; Muzammil, Saima	Biosynthesis of ZnO nanoparticles using <i>Bacillus subtilis</i> : Characterization and nutritive significance for promoting plant growth in <i>Zea mays</i> L	Article		Dose-Response	2020	10.1177/1559325820958911
34	J	Dogaroglu, Zeynep Gorkem; Uysal, Yagmur; caylali, Zehranur; Karakulak, Delil Sefkan	Green nanotechnology advances: Green manufacturing of zinc nanoparticles, characterization, and foliar application on wheat and antibacterial characteristics using <i>Mentha spicata</i> (mint) and <i>Ocimum basilicum</i> (basil) leaf extracts	Article		Environ. Sci. Pollut. Res.	2023	10.1007/s11356-023-26827-3
35	J	Pagano, Luca; Pasquali, Francesco; Majumdar, Sanghamitra; De la Torre-Roche, Roberto; Zuverza-Mena, Nubia; Villani, Marco; Zappettini, Andrea; Marra, Robert E.; Isch, Susan M.; Marmiroli, Marta; Maestri, Elena; Dhankher, Om Parkash; White, Jason C.; Marmiroli, Nelson	Exposure of <i>Cucurbita pepo</i> to binary combinations of engineered nanomaterials: Physiological and molecular response	Article		Environ. Sci.: Nano	2017	10.1039/c7en00219j
36	J	Zhu, Yi; Wu, Jianhua; Chen, Ming; Liu, Xianli; Xiong, Yijie; Wang, Yanyan; Feng, Tao; Kang, Shuang; Wang, Xianfeng	Recent advances in the biotoxicity of metal oxide nanoparticles: Impacts on plants, animals and microorganisms	Review		Chemosphere	2019	10.1016/j.chemosphere.2019.12.4403
37	J	Xu, Jiangbing; Luo, Xiaosan; Wang, Yanling; Feng, Youzhi	Evaluation of zinc oxide nanoparticles on lettuce ( <i>Lactuca sativa</i> L.) growth and soil bacterial community	Article		Environ. Sci. Pollut. Res.	2018	10.1007/s11356-017-0953-7

38	J	Iftikhar, Azka; Ali, Shafaqat; Yasmeen, Tahira; Arif, Muhammad Saleem; Zubair, Muhammad; Rizwan, Muhammad; Alhaithloul, Haifa Abdulaziz S.; Alayafi, Aisha A. M.; Soliman, Mona H.	Effect of gibberellic acid on growth, photosynthesis and antioxidant defense system of wheat under zinc oxide nanoparticle stress	Article		Environ. Pollut.	2019	10.1016/j.envpol.2019.113109
39	J	Bhat, U. H.; Sami, F.; Siddiqui, H.; Faizan, M.; Faraz, A.; Hayat, S.	Nitric oxide alleviates zinc oxide nanoparticles-induced phytotoxicity in <i>Brassica juncea</i>	Article		Russ. J. Plant Physiol.	2021	10.1134/S102144372103002X
40	J	Mazaheri-Tirani, M.; Dayani, S.	Growth, flowering and physiological response of <i>Trachyspermum ammi</i> L. to zinc oxide micro- and nanoparticles	Article		Russ. J. Plant Physiol.	2022	10.1134/S1021443722010125
41	J	Basit, Farwa; Nazir, Muhammad Mudassir; Shahid, Muhammad; Abbas, Saghir; Javed, Muhammad Tariq; Naqqash, Tahir; Liu, Yihan; Guan Yajing	Application of zinc oxide nanoparticles immobilizes the chromium uptake in rice plants by regulating the physiological, biochemical and cellular attributes	Article		Physiol. Mol. Biol. Plants	2022	10.1007/s12298-022-01207-2
42	J	Zhang, Dongqing; Hua, Tao; Xiao, Fei; Chen, Chunping; Gersberg, Richard M.; Liu, Yu; Stuckey, David; Ng, Wun Jern; Tan, Soon Keat	Phytotoxicity and bioaccumulation of ZnO nanoparticles in <i>Schoenoplectus tabernaemontani</i>	Article		Chemosphere	2015	10.1016/j.chemosphere.2014.06.041
43	J	Kashyap, Deeksha; Siddiqui, Zaki Anwar	Effect of zinc oxide nanoparticles and rhizobium leguminosarum on growth, photosynthetic pigments and blight disease complex of pea	Article		Gesunde Pflanz.	2022	10.1007/s10343-021-00586-y
44	J	Mukherjee, Arnab; Pokhrel, Suman; Bandyopadhyay, Susmita; Maedler, Lutz; Peralta-Videa, Jose R.; Gardea-Torresdey, Jorge L.	A soil mediated phyto-toxicological study of iron doped zinc oxide nanoparticles (Fe@ZnO) in green peas ( <i>Pisum sativum</i> L.)	Article		Chem. Eng. J.	2014	10.1016/j.cej.2014.06.112
45	J	Hu, Changwei; Liu, Xu; Li, Xiuling; Zhao, Yongjun	Evaluation of growth and biochemical indicators of <i>Salvinia natans</i> exposed to zinc oxide nanoparticles and zinc accumulation in plants	Article		Environ. Sci. Pollut. Res.	2014	10.1007/s11356-013-1970-9
46	J	Rehman, Riaz Ur; Khan, Bakhtawar; Aziz, Tehmina; Gul, Faiza Zareen; Nasreen, Syeda; Zia, Muhammad	Postponement growth and antioxidative response of <i>Brassica nigra</i> on CuO and ZnO nanoparticles exposure under soil conditions	Article		IET Nanobiotechnol.	2020	10.1049/iet-nbt.2019.0357

47	J	Sun, Liangliang; Wang, Yibo; Wang, Ruling; Wang, Ruting; Zhang, Ping; Ju, Qiong; Xu, Jin	Physiological, transcriptomic, and metabolomic analyses reveal zinc oxide nanoparticles modulate plant growth in tomato	Article		Environ. Sci.: Nano	2020	10.1039/d0en00723d
48	J	Miliauskiene, Jurga; Brazaityte, Ausra; Sutuliene, Ruta; Urbutis, Martynas; Tuckute, Simona	ZnO nanoparticle size-dependent effects on Swiss chard growth and nutritional quality	Article		Agriculture-Basel	2022	10.3390/agriculture12111905
49	J	Mahmud, S.; Din, Z.	Using a pilot plant to synthesise ZnO powder: Particle characterisation and marine toxicity studies	Article		Sains Malays.	2014	
50	J	Caldelas, C.; Poitrasson, F.; Viers, J.; Araus, J. L.	Stable Zn isotopes reveal the uptake and toxicity of zinc oxide engineered nanomaterials in <i>Phragmites australis</i>	Article		Environ. Sci.: Nano	2020	10.1039/d0en00110d
51	J	Ebbs, Stephen D.; Bradfield, Scott J.; Kumar, Pawan; White, Jason C.; Musante, Craig; Ma, Xingmao	Accumulation of zinc, copper, or cerium in carrot ( <i>Daucus carota</i> ) exposed to metal oxide nanoparticles and metal ions	Article		Environ. Sci.: Nano	2016	10.1039/c5en00161g
52	J	Keshta, Fadya S. S.; Shetaya, Waleed H. H.; Marzouk, Ezzat R. R.	The toxicity and uptake of bulk and nano-sized ZnO particles in wheat ( <i>Triticum aestivum</i> ) seedlings	Article; Early Access		J. Plant Nutr.	2023	10.1080/01904167.2023.2210599
53	J	Xiao, Lian; Wang, Shouxia; Yang, Daoyong; Zou, Zhengkang; Li, Junli	Physiological effects of MgO and ZnO nanoparticles on the <i>Citrus maxima</i>	Article		J. Wuhan Univ. Technol.-Mat. Sci. Edit.	2019	10.1007/s11595-019-2042-x
54	J	Wang, X. P.; Li, Q. Q.; Pei, Z. M.; Wang, S. C.	Effects of zinc oxide nanoparticles on the growth, photosynthetic traits, and antioxidative enzymes in tomato plants	Article		Biol. Plant.	2018	10.1007/s10535-018-0813-4
55	J	Khan, Ali Raza; Wakeel, Abdul; Muhammad, Noor; Liu, Bohan; Wu, Minjie; Liu, Yihua; Ali, Imran; Zaidi, Syed Hassan Raza; Azhar, Wardah; Song, Ge; Wu, Junyu; Gan, Yinbo	Involvement of ethylene signaling in zinc oxide nanoparticle-mediated biochemical changes in <i>Arabidopsis thaliana</i> leaves	Article		Environ. Sci.: Nano	2019	10.1039/c8en00971f
56	J	Liu, Lingrui; Nian, Hai; Lian, Tengxiang	Plants and rhizospheric environment: Affected by zinc oxide nanoparticles (ZnO NPs). A review	Article		Plant Physiol. Biochem.	2022	10.1016/j.plaphy.2022.05.032
57	J	Dogaroglu, Zeynep Gorkem; Eren, Abdullah; Baran, M. Firat	Effects of ZnO nanoparticles and ethylenediamine-N,N'-disuccinic acid on seed germination of four different plants	Article		Glob. Chall.	2019	10.1002/gch2.201800111



58	J	Alenezi, Norah Arrak; Al-Qurainy, Fahad; Tarrour, Mohamed; Nadeem, Mohammad; Khan, Salim; Salih, Abdalrhaman M.; Shaikhaldein, Hassan O.; Alfarraj, Norah S.; Gaafar, Abdel-Rhman Z.; Al-Hashimi, Abdulrahman; Alansi, Saleh	Zinc oxide nanoparticles (ZnO NPs), biosynthesis, characterization and evaluation of their impact to improve shoot growth and to reduce salt toxicity on <i>Salvia officinalis</i> in vitro cultivated	Article		Processes	2022	10.3390/pr10071273
59	J	Wang, Xiaoping; Yang, Xiyu; Chen, Siyu; Li, Qianqian; Wang, Wei; Hou, Chunjiang; Gao, Xiao; Wang, Li; Wang, Shucai	Zinc oxide nanoparticles affect biomass accumulation and photosynthesis in <i>Arabidopsis</i>	Article		Front. Plant Sci.	2016	10.3389/fpls.2015.01243
60	J	Adhikari, Sinchan; Adhikari, Ayan; Ghosh, Supriya; Roy, Doyel; Azahar, Ikbali; Basuli, Debapriya; Hossain, Zahed	Assessment of ZnO-NPs toxicity in maize: An integrative microRNAomic approach	Article		Chemosphere	2020	10.1016/j.chemosphere.2020.126197
61	C	Samart, Sutichai; Chutipaijit, Sutee; Phakamas, Nittaya	Evaluating the effect of zinc oxide nanoparticles on the physiological responses of nine non-photoperiod sensitive rice cultivars	Proceedings Paper	International Conference on Science and Technology of Emerging Materials (STEAMa)	Mater. Today-Proc.	2017	10.1016/j.matpr.2017.06.149
62	J	Ahmad, Parvaiz; Alyemeni, Mohammed Nasser; Al-Huqail, Asma A.; Alqahtani, Monerah A.; Wijaya, Leonard; Ashraf, Muhammad; Kaya, Cengiz; Bajguz, Andrzej	Zinc oxide nanoparticles application alleviates arsenic (As) toxicity in soybean plants by restricting the uptake of As and modulating key biochemical attributes, antioxidant enzymes, ascorbate-glutathione cycle and glyoxalase system	Article		Plants-Basel	2020	10.3390/plants9070825
63	J	Mazaheri-Tirani, Maryam; Dayani, Soleyman	In vitro effect of zinc oxide nanoparticles on <i>Nicotiana tabacum</i> callus compared to ZnO micro particles and zinc sulfate (ZnSO <sub>4</sub> )	Article		Plant Cell Tissue Organ Cult.	2020	10.1007/s11240-019-01725-0
64	J	Ni, Yifan; Xiao, Lian; Wan, Fengting; Xu, Mengxuan; Qiu, Lingzhi; Li, Junfeng; Li, Junli	Comparison of the effects of ZnO NPs, MgO NPs and ionic zinc and magnesium on wheat plants	Article		Fresenius Environ. Bull.	2019	

65	J	Tabande, Leila; Sepehri, Mozghan; Yasrebi, Jafar; Zarei, Mehdi; Ghasemi-Fasaei, Reza; Khatabi, Behnam	A comparison between the function of <i>Serendipita indica</i> and <i>Sinorhizobium meliloti</i> in modulating the toxicity of zinc oxide nanoparticles in alfalfa ( <i>Medicago sativa</i> L.)	Article		Environ. Sci. Pollut. Res.	2022	10.1007/s11356-021-16287-y
66	J	Rossi, Lorenzo; Fedenia, Lauren N.; Sharifan, Hamidreza; Ma, Xingmao; Lombardini, Leonardo	Effects of foliar application of zinc sulfate and zinc nanoparticles in coffee ( <i>Coffea arabica</i> L.) plants	Article		Plant Physiol. Biochem.	2019	10.1016/j.plaphy.2018.12.005
67	J	Yang, Zhongzhou; Chen, Jing; Dou, Runzhi; Gao, Xiang; Mao, Chuanbin; Wang, Li	Assessment of the phytotoxicity of metal oxide nanoparticles on two crop plants, maize ( <i>Zea mays</i> L.) and rice ( <i>Oryza sativa</i> L.)	Article		Int. J. Environ. Res. Public Health	2015	10.3390/ijerph121214963
68	J	Mukherjee, Arnab; Sun, Youping; Morelius, Erving; Tamez, Carlos; Bandyopadhyay, Susmita; Niu, Genhua; White, Jason C.; Peralta-Videa, Jose R.; Gardea-Torresdey, Jorge L.	Differential toxicity of bare and hybrid ZnO nanoparticles in green pea ( <i>Pisum sativum</i> L.): A life cycle study	Article		Front. Plant Sci.	2016	10.3389/fpls.2015.01242
69	J	Taherbahrani, Saadiyeh; Zoufan, Parzhak; Zargar, Behrooz	Modulation of the toxic effects of zinc oxide nanoparticles by exogenous salicylic acid pretreatment in <i>Chenopodium murale</i> L.	Article		Environ. Sci. Pollut. Res.	2021	10.1007/s11356-021-15566-y
70	J	Rajput, Vishnu D.; Minkina, Tatiana; Fedorenko, Aleksei; Chernikova, Natalia; Hassan, Tara; Mandzhieva, Saglara; Sushkova, Svetlana; Lysenko, Vladimir; Soldatov, Mikhail A.; Burachevskaya, Marina	Effects of zinc oxide nanoparticles on physiological and anatomical indices in spring barley tissues	Article		Nanomaterials	2021	10.3390/nano11071722
71	J	Rasouli, Farzad; Asadi, Mohammad; Hassanpouraghdam, Mohammad Bagher; Aazami, Mohammad Ali; Ebrahimzadeh, Asghar; Kakaei, Karim; Dokoupil, Libor; Mlcek, Jiri	Foliar application of ZnO-NPs influences chlorophyll fluorescence and antioxidants pool in <i>Capsicum annum</i> L. under salinity	Article		Horticulturae	2022	10.3390/horticulturae8100908
72	J	Chen, Hao	Metal based nanoparticles in agricultural system: Behavior, transport,	Review		Chem. Speciation Bioavail.	2018	10.1080/09542299.2018.1520050

			and interaction with plants					
73	J	Faizan, Mohammad; Bhat, Javaid Akhter; Chen, Chen; Alyemini, Mohammed Nasser; Wijaya, Leonard; Ahmad, Parvaiz; Yu, Fangyuan	Zinc oxide nanoparticles (ZnO-NPs) induce salt tolerance by improving the antioxidant system and photosynthetic machinery in tomato	Article		Plant Physiol. Biochem.	2021	10.1016/j.plaphy.2021.02.002
74	J	Javed, Rabia; Yucesan, Buhara; Zia, Muhammad; Gurel, Ekrem	Elicitation of secondary metabolites in callus cultures of <i>Stevia rebaudiana</i> bertonii grown under ZnO and CuO nanoparticles stress	Article		Sugar Tech.	2018	10.1007/s12355-017-0539-1
75	J	Du, Wenchao; Tan, Wenjuan; Peralta-Videa, Jose R.; Gardea-Torresdey, Jorge L.; Ji, Rong; Yin, Ying; Guo, Hongyan	Interaction of metal oxide nanoparticles with higher terrestrial plants: Physiological and biochemical aspects	Review		Plant Physiol. Biochem.	2017	10.1016/j.plaphy.2016.04.024
76	J	Balazova, L'udmila; Babula, Petr; Balaz, Matej; Backorova, Miriam; Bujnakova, Zdenka; Briancin, Jaroslav; Kurmanbayeva, Assylay; Sagi, Moshe	Zinc oxide nanoparticles phytotoxicity on halophyte from genus <i>Salicornia</i>	Article		Plant Physiol. Biochem.	2018	10.1016/j.plaphy.2018.06.013
77	J	Alhammad, Bushra Ahmed; Ahmad, Awais; Seleiman, Mahmoud F. F.	Nano-hydroxyapatite and ZnO-NPs mitigate Pb stress in maize	Article		Agronomy-Basel	2023	10.3390/agronomy13041174
78	J	Sarkhosh, Sara; Kahrizi, Danial; Darvishi, Elahe; Tourang, Masoud; Haghghi-Mood, Sohrab; Vahedi, Parviz; Ercisli, Sezai	Effect of zinc oxide nanoparticles (ZnO-NPs) on seed germination characteristics in two brassicaceae family species: <i>Camelina sativa</i> and <i>Brassica napus</i> L	Article		J. Nanomater.	2022	10.1155/2022/1892759
79	J	Raghib, Fariha; Naikoo, Mohd Irfan; Khan, Fareed Ahmad; Alyemini, Mohammed Nasser; Ahmad, Parvaiz	Interaction of ZnO nanoparticle and AM fungi mitigates Pb toxicity in wheat by upregulating antioxidants and restricted uptake of Pb	Article		J. Biotechnol.	2020	10.1016/j.jbiotec.2020.09.003
80	J	Sofy, Ahmed R.; Sofy, Mahmoud R.; Hmed, Ahmed A.; Dawoud, Rehab A.; Alnaggar, Abd El-Aleem	Ameliorating the adverse effects of tomato mosaic tobamovirus infecting tomato plants in egypt by boosting immunity in tomato plants using zinc	Article		Molecules	2021	10.3390/molecules26051337

		M.; Soliman, Ahmed M.; El-DougDoug, Noha K.	oxide nanoparticles					
81	J	Skiba, Elzbieta; Pietrzak, Monika; Glinska, Slawa; Wolf, Wojciech M.	The combined effect of ZnO and CeO <sub>2</sub> nanoparticles on <i>Pisum sativum</i> L.: A photosynthesis and nutrients uptake study	Article		Cells	2021	10.3390/cells10113105
82	J	Ramzan, Musarrat; Ayub, Fazila; Shah, Anis Ali; Naz, Gul; Shah, Adnan Noor; Malik, Aqsa; Sardar, Rehana; Telesinski, Arkadiusz; Kalaji, Hazem M.; Dessoky, Eldessoky S.; Elgawad, Hamada Abd	Synergistic effect of zinc oxide nanoparticles and moringa oleifera leaf extract alleviates cadmium toxicity in <i>Linum usitatissimum</i> : Antioxidants and physiochemical studies	Article		Front. Plant Sci.	2022	10.3389/fpls.2022.900347
83	J	Yang, Weiwei; Cheng, Peng; Adams, Catharine A.; Zhang, Shuwu; Sun, Yuhuan; Yu, Hongwei; Wang, Fayuan	Effects of microplastics on plant growth and arbuscular mycorrhizal fungal communities in a soil spiked with ZnO nanoparticles	Article		Soil Biol. Biochem.	2021	10.1016/j.soilbio.2021.108179
84	J	Dimkpa, Christian O.; Latta, Drew E.; McLean, Joan E.; Britt, David W.; Boyanov, Maxim I.; Anderson, Anne J.	Fate of CuO and ZnO nano- and microparticles in the plant environment	Article		Environ. Sci. Technol.	2013	10.1021/es304736y
85	J	Mansoor, Nayyab; Younus, Ayesha; Jamil, Yasir; Shahid, Muhammad	Impact of nanosized and bulk ZnO on germination and early growth response of <i>Triticum aestivum</i>	Article		Pak. J. Agric. Sci.	2019	10.21162/PAKJAS/19.8544
86	J	Li, Sen; Liu, Juan; Wang, Yibo; Gao, Yang; Zhang, Zhipeng; Xu, Jin; Xing, Guoming	Comparative physiological and metabolomic analyses revealed that foliar spraying with zinc oxide and silica nanoparticles modulates metabolite profiles in cucumber ( <i>Cucumis sativus</i> L.)	Article		Food Energy Secur.	2021	10.1002/fes3.269
87	J	Tokarsky, Jonas; Kutlakova, Katerina Mamulova; Podlipna, Radka; Vanek, Tomas	Phytotoxicity of ZnO/kaolinite nanocomposite-is anchoring the right way to lower environmental risk?	Article		Environ. Sci. Pollut. Res.	2019	10.1007/s11356-019-05529-9
88	J	Molnar, Arpad; Papp, Mark; Kovacs, David Zoltan; Belteky, Peter; Olah, Dora; Feigl, Gabor; Szollosi, Reka; Razga, Zsolt; Ordog, Attila; Erdei, Laszlo; Ronavari,	Nitro-oxidative signalling induced by chemically synthesized zinc oxide nanoparticles (ZnO NPs) in <i>Brassica</i> species	Article		Chemosphere	2020	10.1016/j.chemosphere.2020.126419

		Andrea; Konya, Zoltan; Kolbert, Zsuzsanna						
89	J	Ali, Shafaqat; Rizwan, Muhammad; Noureen, Shamaila; Anwar, Sarwat; Ali, Basharat; Naveed, Muhammad; Abd Allah, Elsayed Fathi; Alqarawi, Abdulaziz A.; Ahmad, Parvaiz	Combined use of biochar and zinc oxide nanoparticle foliar spray improved the plant growth and decreased the cadmium accumulation in rice ( <i>Oryza sativa</i> L.) plant	Article		Environ. Sci. Pollut. Res.	2019	10.1007/s11356-019-04554-y
90	J	Chen, Juan; Liu, Xiang; Wang, Chao; Yin, Shan-Shan; Li, Xiu-Ling; Hu, Wen-Jun; Simon, Martin; Shen, Zhi-Jun; Xiao, Qiang; Chu, Cheng-Cai; Peng, Xin-Xiang; Zheng, Hai-Lei	Nitric oxide ameliorates zinc oxide nanoparticles-induced phytotoxicity in rice seedlings	Article		J. Hazard. Mater.	2015	10.1016/j.jhazmat.2015.04.077
91	J	Tirani, Maryam Mazaheri; Haghjou, Maryam Madadkar; Sulieman, Saad; Colville, Louise; Ismaili, Ahmad	The influence of organic and inorganic chelators on the toxicity of bulk and nanoparticles of zinc oxide during germination and seedling growth of <i>Nicotiana tabacum</i> L.	Article		Plant Biosyst.	2019	10.1080/11263504.2018.1498402
92	J	Jain, Navin; Bhargava, Arpit; Pareek, Vikram; Akhtar, Mohd. Sayeed; Panwar, Jitendra	Does seed size and surface anatomy play role in combating phytotoxicity of nanoparticles?	Article		Ecotoxicology	2017	10.1007/s10646-017-1758-7
93	J	Pishkar, Leila; Yousefi, Soheil; Iranbakhsh, Alireza	Foliar application of Zinc oxide nanoparticles alleviates cadmium toxicity in purslane by maintaining nutrients homeostasis and improving the activity of antioxidant enzymes and glyoxalase system	Article		Ecotoxicology	2022	10.1007/s10646-022-02533-7
94	J	Oleszczuk, Patryk; Czech, Bozena; Konczak, Magdalena; Bogusz, Aleksandra; Siatecka, Anna; Godlewska, Paulina; Wiesner, Mark	Impact of ZnO and ZnS nanoparticles in sewage sludge-amended soil on bacteria, plant and invertebrates	Article		Chemosphere	2019	10.1016/j.chemosphere.2019.124359
95	J	Gomes, Alex Rodrigues; Matos, Leticia Paiva de; Guimara, Abraao Tiago Batista; Freitas, Italo	Plant-ZnO nanoparticles interaction: An approach to improve guinea grass ( <i>Panicum maximum</i> ) productivity and evaluation of the impacts of its ingestion	Article		J. Hazard. Mater.	2023	10.1016/j.jhazmat.2023.131173

		Nascimento; Luz, Thiarlen Marinho da; Silva, Abner Marcelino; Matos, Stenio Gonsalves da Silva; Rodrigues, Aline Sueli de Lima; Ferreira, Raissa de Oliveira; Islam, Abu Reza Md. Towfiqul; Rahman, Md. Mostafizur; Ragavendran, Chinnasamy; Kamaraj, Chinnaperumal; Mubarak, Nabisab Mujawar; Arias, Andres Hugo; Gomes, Paula Cristine Silva; Silva, Fabiano Guimaraes; Malafaia, Guilherme	by freshwater teleost fish					
96	J	Zafar, Hira; Abbasi, Bilal Haider; Zia, Muhammad	Physiological and antioxidative response of <i>Brassica nigra</i> (L.) to ZnO nanoparticles grown in culture media and soil	Article		Toxicol Environ. Chem.	2019	10.1080/02772248.2019.1691555
97	J	Elemike, Elias E.; Onwudiwe, Damian C.; Ogeleka, Doris F.; Obasi, Esther C.	Biomediated cellulose-Ag-ZnO nanocomposites and their ecotoxicological assessment using onion bulb plant	Article		J. Clust. Sci.	2021	10.1007/s10876-020-01826-3
98	J	Haisel, Daniel; Cyrusova, Tereza; Vanek, Tomas; Podlipna, Radka	The effect of nanoparticles on the photosynthetic pigments in cadmiumzinc interactions	Article		Environ. Sci. Pollut. Res.	2019	10.1007/s11356-018-04060-7
99	J	Dogaroglu, Zeynep G.; Koleli, Nurcan	TiO <sub>2</sub> and ZnO nanoparticles toxicity in barley ( <i>Hordeum vulgare</i> L.)	Article		Clean-Soil Air Water	2017	10.1002/clen.201700096
100	J	Basit, Farwa; Shahid, Muhammad; Abbas, Saghir; Naqqash, Tahir; Akram, Muhammad Sohail; Tahir, Muhammad; Azeem, Muhammad; Cai, Yibei; Jia, Shuhan; Hu, Jin; Liang, Xinqiang; Guan, Yajing	Protective role of ZnO nanoparticles in soybean seedlings growth and stress management under Cr-enriched conditions	Article		Plant Growth Regul.	2023	10.1007/s10725-023-00965-7
101	J	Dimkpa, Christian O.; Hansen, Trevor; Stewart, Jacob; McLean, Joan E.; Britt, David W.; Anderson, Anne J.	ZnO nanoparticles and root colonization by a beneficial pseudomonad influence essential metal responses in bean ( <i>Phaseolus vulgaris</i> )	Article		Nanotoxicology	2015	10.3109/17435390.2014.900583

102	J	Raliya, Ramesh; Nair, Remya; Chavalmane, Sanmathi; Wang, Wei-Ning; Biswas, Pratim	Mechanistic evaluation of translocation and physiological impact of titanium dioxide and zinc oxide nanoparticles on the tomato ( <i>Solanum lycopersicum</i> L.) plant	Article		Metallomics	2015	10.1039/c5mt00168d
103	J	Zafar, Hira; Aziz, Tehmina; Khan, Bakhtawar; Mannan, Abdul; Rehman, Riaz Ur; Zia, Muhammad	CuO and ZnO nanoparticle application in synthetic soil modulates morphology, nutritional contents, and metal analysis of <i>Brassica nigra</i>	Article		ACS Omega	2020	10.1021/acsomega.0c00030
104	J	Leopold, Loredana F.; Coman, Cristina; Clapa, Doina; Oprea, Ioana; Toma, Alexandra; Iancu, Stefania D.; Barbu-Tudoran, Lucian; Suciu, Maria; Ciorita, Alexandra; Cadis, Adrian I.; Muresan, Laura Elena; Perhaita, Ioana Mihaela; Copolovici, Lucian; Copolovici, Dana M.; Copaciu, Florina; Leopold, Nicolae; Vodnar, Dan C.; Coman, Vasile	The effect of 100-200 nm ZnO and TiO <sub>2</sub> nanoparticles on the in vitro-grown soybean plants	Article		Colloid Surf. B-Biointerfaces	2022	10.1016/j.colsurfb.2022.112536
105	J	Kim, Sung Hoon; Bae, Sujin; Hwang, Yu Sik	Comparative bioaccumulation, translocation, and phytotoxicity of metal oxide nanoparticles and metal ions in soil-crop system	Article		Sci. Total Environ.	2023	10.1016/j.scitotenv.2022.158938
106	J	Salehi, Hajar; Diego, Nuria De; Rad, Abdolkarim Chehregani; Benjamin, Jenifer Joseph; Trevisan, Marco; Lucini, Luigi	Exogenous application of ZnO nanoparticles and ZnSO <sub>4</sub> distinctly influence the metabolic response in <i>Phaseolus vulgaris</i> L.	Article		Sci. Total Environ.	2021	10.1016/j.scitotenv.2021.146331
107	J	Shafiq, Tayyab; Yasmin, Humaira; Shah, Zafar Abbas; Nosheen, Asia; Ahmad, Parvaiz; Kaushik, Prashant; Ahmad, Ajaz	Titanium oxide and zinc oxide nanoparticles in combination with cadmium tolerant <i>Bacillus pumilus</i> ameliorates the cadmium toxicity in maize	Article		Antioxidants	2022	10.3390/antiox11112156
108	J	Jahan, Shanaz; Alias, Yatimah Binti; Bin Abu Bakar, Ahmad Farid; Bin Yusoff, Ismail	Toxicity evaluation of ZnO and TiO <sub>2</sub> nanomaterials in hydroponic red bean ( <i>Vigna angularis</i> ) plant: Physiology, biochemistry and kinetic transport	Article		J. Environ. Sci.	2018	10.1016/j.jes.2017.12.022

109	J	Singh, Divya; Kumar, Arun	Investigating long-term effect of nanoparticles on growth of <i>Raphanus sativus</i> plants: A trans-generational study	Article		Ecotoxicology	2018	10.1007/s10646-017-1867-3
110	J	Faizan, Mohammad; Bhat, Javaid Akhter; Hessini, Kamel; Yu, Fangyuan; Ahmad, Parvaiz	Zinc oxide nanoparticles alleviates the adverse effects of cadmium stress on <i>Oryza sativa</i> via modulation of the photosynthesis and antioxidant defense system	Article		Ecotox. Environ. Safe.	2021	10.1016/j.ecoenv.2021.112401
111	J	Sun, Hongda; Li, Zhuofan; Wen, Jinyu; Zhou, Qianqian; Gong, Yafang; Zhao, Xiaohan; Mao, Hui	Co-exposure of maize to polyethylene microplastics and ZnO nanoparticles: Impact on growth, fate, and interaction	Article		Sci. Total Environ.	2023	10.1016/j.scitotenv.2023.162705
112	J	Salih, Abdalrhaman M.; Al-Qurainy, Fahad; Khan, Salim; Tarroum, Mohamed; Nadeem, Mohammad; Shaikhaldein, Hassan O.; Gaafar, Abdel-Rhman Zakaria; Alfarraj, Norah S.	Biosynthesis of zinc oxide nanoparticles using <i>Phoenix dactylifera</i> and their effect on biomass and phytochemical compounds in <i>Juniperus procera</i>	Article		Sci Rep	2021	10.1038/s41598-021-98607-3
113	J	Chen, Jing; Dou, Runzhi; Yang, Zhongzhou; You, Tingting; Gao, Xiang; Wang, Li	Phytotoxicity and bioaccumulation of zinc oxide nanoparticles in rice ( <i>Oryza sativa</i> L.)	Article		Plant Physiol. Biochem.	2018	10.1016/j.plaphy.2018.08.019
114	J	Faizan, Mohammad; Faraz, Ahmad; Mir, Anayat Rasool; Hayat, Shamsul	Role of zinc oxide nanoparticles in countering negative effects generated by cadmium in <i>Lycopersicon esculentum</i>	Article		J. Plant Growth Regul.	2021	10.1007/s00344-019-10059-2
115	J	Zhao, Lijuan; Sun, Youping; Hernandez-Viezcas, Jose A.; Servin, Alia D.; Hong, Jie; Niu, Genhua; Peralta-Videa, Jose R.; Duarte-Gardea, Maria; Gardea-Torresdey, Jorge L.	Influence of CeO <sub>2</sub> and ZnO nanoparticles on cucumber physiological markers and bioaccumulation of Ce and Zn: A life cycle study	Article		J. Agric. Food Chem.	2013	10.1021/jf404328e
116	J	Zou, Congming; Lu, Tianquan; Wang, Ruting; Xu, Peng; Jing, Yifen; Wang, Ruling; Xu, Jin; Wan, Jinpeng	Comparative physiological and metabolomic analyses reveal that Fe <sub>3</sub> O <sub>4</sub> and ZnO nanoparticles alleviate Cd toxicity in tobacco	Article		J. Nanobiotechnol.	2022	10.1186/s12951-022-01509-3
117	J	Kim, Sunghyun; Sin, Hyunjoo; Lee, Sooyeon; Lee, Insook	Influence of metal oxide particles on soil enzyme activity and bioaccumulation of two plants	Article		J. Microbiol. Biotechnol.	2013	10.4014/jmb.1304.04084



118	J	Thwala, Melusi; Klaine, Stephen J.; Musee, Ndeke	Interactions of metal-based engineered nanoparticles with aquatic higher plants: A review of the state of current knowledge	Review		Environ. Toxicol. Chem.	2016	10.1002/etc.3364
119	J	Srivastav, Akansha; Ganjewala, Deepak; Singhal, Rakesh Kumar; Rajput, Vishnu D.; Minkina, Tatiana; Voloshina, Marina; Srivastava, Sudhakar; Shrivastava, Manoj	Effect of ZnO nanoparticles on growth and biochemical responses of wheat and maize	Article		Plants-Basel	2021	10.3390/plants10122556
120	J	Batista de Souza, Adriana Alves; Araujo do Nascimento, Clistenes Williams; de Souza, Edivan Rodrigues	Mineral composition, chlorophyll fluorescence and zinc biofortification in <i>Vigna unguiculata</i> fertilized with bulk and nanoparticulate zinc oxides	Article		Acta Physiol. Plant.	2021	10.1007/s11738-021-03333-y
121	J	Wang, Peng; Menzies, Neal W.; Lombi, Enzo; McKenna, Brigid A.; Johannessen, Bernt; Glover, Chris J.; Kappen, Peter; Kopittke, Peter M.	Fate of ZnO nanoparticles in soils and cowpea ( <i>Vigna unguiculata</i> )	Article		Environ. Sci. Technol.	2013	10.1021/es403466p
122	J	Abou-Zeid, Hanan Mahmoud; Ismail, Ghada Saber Mohamed; Abdel-Latif, Salwa Ahmed	Influence of seed priming with ZnO nanoparticles on the salt-induced damages in wheat ( <i>Triticum aestivum</i> L.) plants	Article		J. Plant Nutr.	2021	10.1080/01904167.2020.1849288
123	J	Zhu, Jiahui; Zou, Ziheng; Shen, Yu; Li, Jinfeng; Shi, Shengnan; Han, Shuwen; Zhan, Xinhua	Increased ZnO nanoparticle toxicity to wheat upon co-exposure to phenanthrene	Article		Environ. Pollut.	2019	10.1016/j.envpol.2019.01.046
124	J	Sun, Zhiqiang; Xiong, Tiantian; Zhang, Ting; Wang, Nanfang; Chen, Da; Li, Shaoshan	Influences of zinc oxide nanoparticles on <i>Allium cepa</i> root cells and the primary cause of phytotoxicity	Article		Ecotoxicology	2019	10.1007/s10646-018-2010-9
125	J	Guo, Junhong; Li, Shuxin; Brestic, Marian; Li, Na; Zhang, Peng; Liu, Lei; Li, Xiangnan	Modulations in protein phosphorylation explain the physiological responses of barley ( <i>Hordeum vulgare</i> ) to nanoplastics and ZnO nanoparticles	Article		J. Hazard. Mater.	2023	10.1016/j.jhazmat.2022.130196
126	J	Azarin, Kirill; Usatov, Alexander; Minkina, Tatiana; Duplii, Nadezhda; Kasyanova, Alexandra;	Effects of bulk and nano-ZnO particles on functioning of photosynthetic apparatus in barley ( <i>Hordeum vulgare</i> L.)	Article		Environ. Res.	2023	10.1016/j.envres.2022.114748

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127	J	Torbati, Samaneh; Khataee, Alireza; Saadi, Shabnam	Comparative phytotoxicity of undoped and Er-doped ZnO nanoparticles on <i>Lemna minor</i> L.: Changes in plant physiological responses	Article		Turk. J. Biol.	2017	10.3906/biy-1611-27
128	J	Skiba, Elzbieta; Michlewska, Sylwia; Pietrzak, Monika; Wolf, Wojciech M.	Additive interactions of nanoparticulate ZnO with copper, manganese and iron in <i>Pisum sativum</i> L., a hydroponic study	Article		Sci Rep	2020	10.1038/s41598-020-70303-8
129	J	Garcia-Gomez, Concepcion; Obrador, Ana; Gonzalez, Demetrio; Babin, Mar; Dolores Fernandez, Maria	Comparative effect of ZnO NPs, ZnO bulk and ZnSO <sub>4</sub> in the antioxidant defences of two plant species growing in two agricultural soils under greenhouse conditions	Article		Sci. Total Environ.	2017	10.1016/j.scitotenv.2017.02.153
130	J	Yoshihara, Shizue; Yamamoto, Kasumi; Nakajima, Yoshino; Takeda, Satomi; Kurahashi, Kensuke; Tokumoto, Hayato	Absorption of zinc ions dissolved from zinc oxide nanoparticles in the tobacco callus improves plant productivity	Article		Plant Cell Tissue Organ Cult.	2019	10.1007/s11240-019-01636-0
131	J	Akhtar, Nazneen; Khan, Sehresh; Rehman, Shafiq Ur; Rehman, Zia Ur; Khatoon, Amana; Rha, Eui Shik; Jamil, Muhammad	Synergistic effects of zinc oxide nanoparticles and bacteria reduce heavy metals toxicity in rice ( <i>Oryza sativa</i> L.) plant	Article		Toxics	2021	10.3390/toxics9050113
132	J	Salam, Abdul; Khan, Ali Raza; Liu, Li; Yang, Shuaiqi; Azhar, Wardah; Ulhassan, Zaid; Zeeshan, Muhammad; Wu, Junyu; Fan, Xingming; Gan, Yinbo	Seed priming with zinc oxide nanoparticles downplayed ultrastructural damage and improved photosynthetic apparatus in maize under cobalt stress	Article		J. Hazard. Mater.	2022	10.1016/j.jhazmat.2021.127021
133	J	Rexlin, J.; Vijayakumar, S.; Nilavukkarasi, M.; Vidhya, E.; Alharthi, Nahed S.; Sajjad, Maryium; Punitha, V. N.; Praseetha, P. K.	Bioengineered ZnO nanoparticles as a nano priming agent in <i>Cyamopsis tetragonoloba</i> (L.) Taub. to improve yield and disease resistance	Article; Early Access		Appl. Nanosci.	2022	10.1007/s13204-022-02526-2
134	J	Lv, Jitao.; Zhang, Shuzhen.; Luo, Lei.; Zhang, Jing.; Yang, Ke.; Christie, Peter.	Accumulation, speciation and uptake pathway of ZnO nanoparticles in maize	Article		Environ. Sci.: Nano	2015	10.1039/c4en00064a

135	J	Farghaly, Fatma A.; Radi, Abeer A.; Al-Kahtany, Fatma A.; Hamada, Afaf M.	Impacts of zinc oxide nano and bulk particles on redox-enzymes of <i>the Punica granatum</i> callus	Article		Sci Rep	2020	10.1038/s41598-020-76664-4
136	J	Chen, Xiaolin; O'Halloran, John; Jansen, Marcel A. K.	Time matters: The toxicity of zinc oxide nanoparticles to <i>Lemna minor</i> L. increases with exposure time	Article		Water Air Soil Pollut.	2018	10.1007/s11270-018-3759-4
137	J	Watson, Jean-Luc; Fang, Tommy; Dimkpa, Christian O.; Britt, David W.; McLean, Joan E.; Jacobson, Astrid; Anderson, Anne J.	The phytotoxicity of ZnO nanoparticles on wheat varies with soil properties	Article		Biometals	2015	10.1007/s10534-014-9806-8
138	J	Ahmad, Muhammad Arslan; Javed, Rabia; Adeel, Muhammad; Rizwan, Muhammad; Ao, Qiang; Yang, Yuesuo	Engineered ZnO and CuO nanoparticles ameliorate morphological and biochemical response in tissue culture regenerants of candyleaf ( <i>Stevia rebaudiana</i> )	Article		Molecules	2020	10.3390/molecules25061356
139	J	Lee, Sooyeon; Chung, Hyein; Kim, Saeyon; Lee, Insook	The genotoxic effect of ZnO and CuO nanoparticles on early growth of buckwheat, <i>fagopyrum esculentum</i>	Article		Water Air Soil Pollut.	2013	10.1007/s11270-013-1668-0
140	J	Sun, Hongda; Guo, Wei; Zhou, Qianqian; Gong, Yafang; Lv, Zhiyuan; Wang, Quan; Mao, Hui; Kopittke, Peter M.	Uptake, transformation, and environmental impact of zinc oxide nanoparticles in a soil-wheat system	Article		Sci. Total Environ.	2022	10.1016/j.scitotenv.2022.159307
141	J	Mohamed, Ekram Abdelhaliem; Harbi, Hanan Fahad A. L.; Aref, Nagwa	Radioprotective efficacy of zinc oxide nanoparticles on gamma-ray-induced nuclear DNA damage in <i>Vicia faba</i> L. as evaluated by DNA bioassays	Article		J. Radiat. Res. Appl. Sci.	2019	10.1080/16878507.2019.1690798
142	J	Lv, Zhiyuan; Sun, Hongda; Du, Wei; Li, Ruoyi; Mao, Hui; Kopittke, Peter M.	Interaction of different-sized ZnO nanoparticles with maize ( <i>Zea mays</i> ) Accumulation, biotransformation and phytotoxicity	Article		Sci. Total Environ.	2021	10.1016/j.scitotenv.2021.148927
143	C	Awasthi, Anjali; Bansal, Sonu; Jangir, Lokesh Kumar; Awasthi, Garima; Awasthi, Kumud Kant; Awasthi, Kamalendra	Effect of ZnO nanoparticles on germination of <i>Triticum aestivum</i> seeds	Proceedings Paper	2nd Conference on Soft Materials (ICSM)	Macromol. Symp.	2017	10.1002/masy.201700043
144	J	Kumari, Arpna; Chokheli, Vasily A.; Lysenko, Vladimir S.; Mandzhieva, Saglara S.; Minkina, Tatiana M.; Mazarji, Mahmoud;	Genotoxic and morpho-physiological responses of ZnO macro- and nano-forms in plants	Article; Early Access		Environ. Geochem. Health	2022	10.1007/s10653-022-01428-0

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145	J	Sun, Yan; Mfarrej, Manar Fawzi Bani; Song, Xiaojun; Ma, Jing; Min, Bolin; Chen, Fu	New insights in to the ameliorative effects of zinc and iron oxide nanoparticles to arsenic stressed spinach ( <i>Spinacia oleracea</i> L.)	Article		Plant Physiol. Biochem.	2023	10.1016/j.plaphy.2023.107715
146	J	Nemcek, Lucia; Sebesta, Martin; Urik, Martin; Bujdos, Marek; Dobrocka, Edmund; Vavra, Ivo	Impact of bulk ZnO, ZnO nanoparticles and dissolved Zn on early growth stages of barley-a pot experiment	Article		Plants-Basel	2020	10.3390/plants9101365
147	J	Zhang, Wei; Long, Jinghua; Li, Jie; Zhang, Meng; Xiao, Guoliang; Ye, Xingyin; Chang, Wenjing; Zeng, Hui	Impact of ZnO nanoparticles on Cd toxicity and bioaccumulation in rice ( <i>Oryza sativa</i> L.)	Article		Environ. Sci. Pollut. Res.	2019	10.1007/s11356-019-05551-x
148	J	Petrova, Sarka; Soudek, Petr	Ecotoxicity study of additives composed of zinc and boron	Article		Toxics	2022	10.3390/toxics10120795
149	J	Zoufan, Parzhak; Baroonian, Maryam; Zargar, Behrooz	ZnO nanoparticles-induced oxidative stress in <i>Chenopodium murale</i> L, Zn uptake, and accumulation under hydroponic culture	Article		Environ. Sci. Pollut. Res.	2020	10.1007/s11356-020-07735-2
150	J	Ghouri, Fozia; Shahid, Munazzam Jawad; Liu, Jingwen; Lai, Mingyu; Sun, Lixia; Wu, Jinwen; Liu, Xiangdong; Ali, Shafaqat; Shahid, Muhammad Qasim	Polyploidy and zinc oxide nanoparticles alleviated Cd toxicity in rice by modulating oxidative stress and expression levels of sucrose and metal-transporter genes	Article		J. Hazard. Mater.	2023	10.1016/j.jhazmat.2023.130991
151	J	Iqbal, I.; Bhatti, K. H.	The combined effect of ZnO nanoparticles and toxicity of heavy metals (arsenic and chromium) on the morphological, biochemical attributes of wheat ( <i>Triticum aestivum</i> L.) as well as soil and water properties	Article; Early Access		Appl. Ecol. Environ. Res.	2021	10.15666/aecer/2004_28972912
152	J	Raigond, P.; Raigond, B.; Kaundal, B.; Singh, B.; Joshi, A.; Dutt, S.	Effect of zinc nanoparticles on antioxidative system of potato plants	Article		J. Environ. Biol.	2017	10.22438/jeb/38/3/MS-209
153	J	Singh, Jagpreet; Kumar, Sumit; Alok, Anshu; Upadhyay, Santosh Kumar; Rawat, Mohit; Tsang, Daniel C. W.; Bolan, Nanthi; Kim,	The potential of green synthesized zinc oxide nanoparticles as nutrient source for plant growth	Article		J. Clean Prod.	2019	10.1016/j.jclepro.2019.01.018

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154	J	Kouhi, Seyed Mousa Mousavi; Lahouti, Mehrdad; Ganjeali, Ali; Entezari, Mohammad H.	Comparative effects of ZnO nanoparticles, ZnO bulk particles, and Zn <sup>2+</sup> on brassica napus after long-term exposure: Changes in growth, biochemical compounds, antioxidant enzyme activities, and Zn bioaccumulation	Article		Water Air Soil Pollut.	2015	10.1007/s11270-015-2628-7
155	J	Wang, Xiaoxuan; Sun, Wenjie; Zhang, Sha; Sharifan, Hamidreza; Ma, Xingmao	Elucidating the effects of cerium oxide nanoparticles and zinc oxide nanoparticles on arsenic uptake and speciation in rice ( <i>Oryza sativa</i> ) in a hydroponic system	Article		Environ. Sci. Technol.	2018	10.1021/acs.est.8b01664
156	J	Hashemi, Shahla; Asrar, Zahra; Pourseyedi, Shahram; Nademejad, Nazi	Investigation of ZnO nanoparticles on proline, anthocyanin contents and photosynthetic pigments and lipid peroxidation in the soybean	Article		IET Nanobiotechnol.	2019	10.1049/iet-nbt.2018.5212
157	J	Sun, Hongda; Peng, Qingqing; Guo, Jiao; Zhang, Haoyue; Bai, Junrui; Mao, Hui	Effects of short-term soil exposure of different doses of ZnO nanoparticles on the soil environment and the growth and nitrogen fixation of alfalfa	Article		Environ. Pollut.	2022	10.1016/j.envpol.2022.119817
158	J	Hong, Mo; Gong, Ji-Lai; Cao, Wei-Cheng; Fang, Rong; Cai, Zhe; Ye, Jun; Chen, Zeng-Ping; Tang, Wang-Wang	The combined toxicity and mechanism of multi-walled carbon nanotubes and nano zinc oxide toward the cabbage	Article		Environ. Sci. Pollut. Res.	2022	10.1007/s11356-021-15857-4
159	J	Azarin, Kirill; Usatov, Alexander; Minkina, Tatiana; Plotnikov, Andrey; Kasyanova, Alexandra; Fedorenko, Aleksei; Duplii, Nadezhda; Vechkanov, Evgeniy; Rajput, Vishnu D.; Mandzhieva, Saglara; Alamri, Saud	Effects of ZnO nanoparticles and its bulk form on growth, antioxidant defense system and expression of oxidative stress related genes in <i>Hordeum vulgare</i> L	Article		Chemosphere	2022	10.1016/j.chemosphere.2021.132167
160	J	Landa, Premysl	Positive effects of metallic nanoparticles on plants: Overview of involved mechanisms	Review		Plant Physiol. Biochem.	2021	10.1016/j.plaphy.2021.01.039
161	J	Baskar, Venkidasamy; Safia, Nayeem; Sree Preethy, Kuppuraj; Dhivya, Selvaraj;	A comparative study of phytotoxic effects of metal oxide (CuO, ZnO and NiO) nanoparticles on in-vitro grown	Article		Plant Biosyst.	2021	10.1080/11263504.2020.1753843

		Thiruvengadam, Muthu; Sathishkumar, Ramalingam	<i>Abelmoschus esculentus</i>					
162	J	Emamverdian, Abolghassem; Hasanuzzaman, Mirza; Ding, Yulong; Barker, James; Mokhberdoran, Farzad; Liu, Guohua	Zinc oxide nanoparticles improve <i>Pleioblastus pygmaeus</i> plant tolerance to arsenic and mercury by stimulating antioxidant defense and reducing the metal accumulation and translocation	Article		Front. Plant Sci.	2022	10.3389/fpls.2022.841501
163	J	Peng, Cheng; Tong, Hong; Shen, Chensi; Sun, Lijuan; Yuan, Peng; He, Miao; Shi, Jiyan	Bioavailability and translocation of metal oxide nanoparticles in the soil-rice plant system	Article		Sci. Total Environ.	2020	10.1016/j.scitotenv.2020.136662
164	J	Ruiz-Torres, Norma; Flores-Naveda, Antonio; Barriga-Castro, Enrique Diaz; Camposeco-Montejo, Neymar; Ramirez-Barron, Sonia; Borrego-Escalante, Fernando; Nino-Medina, Guillermo; Hernandez-Juarez, Agustin; Garza-Alonso, Carlos; Rodriguez-Salinas, Pablo; Garcia-Lopez, Josue I.	Zinc oxide nanoparticles and zinc sulfate impact physiological parameters and boosts lipid peroxidation in soil grown coriander plants ( <i>Coriandrum sativum</i> )	Article		Molecules	2021	10.3390/molecules26071998
165	J	Hezaveh, Torfeh Akhavan; Pourakbar, Latifeh; Rahmani, Fatemeh; Alipour, Hadi	Interactive effects of salinity and ZnO nanoparticles on physiological and molecular parameters of rapeseed ( <i>Brassica napus</i> L.)	Article		Commun. Soil Sci. Plant Anal.	2019	10.1080/00103624.2019.1589481
166	J	Zarate-Cruz, Griselda S.; Zavaleta-Mancera, Hilda A.; Alarcon, Alejandro; Jimenez-Garcia, Luis F.	Phytotoxicity of ZnO nanoparticles on the aquatic fern <i>Azolla Filiculoides</i> Lam	Article		Agrociencia	2016	
167	J	Wojcieszek, Justyna; Jimenez-Lamana, Javier; Bierla, Katarzyna; Asztemborska, Monika; Ruzik, Lena; Jarosz, Maciej; Szpunar, Joanna	Elucidation of the fate of zinc in model plants using single particle ICP-MS and ESI tandem MS	Article		J. Anal. At. Spectrom.	2019	10.1039/c8ja00390d
168	J	Zhang, Hong.; Chen, Zhu.; Huang, Qing.	Study of the toxicity of ZnO nanoparticles to <i>Chlorella sorokiniana</i> under the influence of phosphate: Spectroscopic quantification,	Article		Environ. Sci.: Nano	2020	10.1039/c9en01464k

			photosynthetic efficiency and gene expression analysis					
169	J	Zhang Lan-lan; Xu Chang-shan; Chen Ze-lin; Shao Hai-ling; Zhang Hai-jiao; Qiao Jin	Distribution of aloe-emodin and its color and spectral properties under the influence of ZnO NPs	Article		Spectrosc. Spectr. Anal.	2018	10.3964/j.issn.1000-0593(2018)03-0883-07
170	J	Faizan, Mohammad; Bhat, Javaid Akhter; Noureldeen, Ahmed; Ahmad, Parvaiz; Yu, Fangyuan	Zinc oxide nanoparticles and 24-epibrassinolide alleviates Cu toxicity in tomato by regulating ROS scavenging, stomatal movement and photosynthesis	Article		Ecotox. Environ. Safe.	2021	10.1016/j.ecoenv.2021.112293
171	J	Wan, Jinpeng.; Wang, Ruling.; Bai, Hanrui.; Wang, Yibo.; Xu, Jin.	Comparative physiological and metabolomics analysis reveals that single-walled carbon nanohorns and ZnO nanoparticles affect salt tolerance in <i>Sophora alopecuroides</i>	Article		Environ. Sci.: Nano	2020	10.1039/d0en00582g
172	J	Caldelas, C.; Guri, R.; Araus, J. L.; Sorolla, A.	Effect of ZnO nanoparticles on Zn, Cu, and Pb dissolution in a green bioretention system for urban stormwater remediation	Article		Chemosphere	2021	10.1016/j.chemosphere.2021.131045
173	J	Khoshgoftarmanesh, Amir Hossein; Markarian, Shakeh	Antioxidant response of wheat to tire rubber ash and ZnO nanoparticles and ionic zinc exposure in nutrient solution culture	Article		Acta Physiol. Plant.	2022	10.1007/s11738-022-03384-9
174	J	Xiao, Yunmu; Li, Yong; Shi, Yang; Li, Ziqian; Zhang, Xuyuan; Liu, Ting; Farooq, Taimoor Hassan; Pan, Yuliang; Chen, Xiaoyong; Yan, Wende	Combined toxicity of zinc oxide nanoparticles and cadmium inducing root damage in <i>Phytolacca americana</i> L.	Article		Sci. Total Environ.	2022	10.1016/j.scitotenv.2021.151211
175	J	Wu, Jingjing; Wang, Ting	Synergistic effect of zinc oxide nanoparticles and heat stress on the alleviation of transcriptional gene silencing in <i>Arabidopsis thaliana</i>	Article		Bull. Environ. Contam. Toxicol.	2020	10.1007/s00128-019-02749-0
176	J	Medina-Velo, Illya A.; Barrios, Ana C.; Zuverza-Mena, Nubia; Hernandez-Viezcas, Jose A.; Chang, Chong Hyun; Ji, Zhaoxia; Zink, Jeffrey I.; Peralta-Videa, Jose R.; Gardea-Torresdey, Jorge L.	Comparison of the effects of commercial coated and uncoated ZnO nanomaterials and Zn compounds in kidney bean ( <i>Phaseolus vulgaris</i> ) plants	Article		J. Hazard. Mater.	2017	10.1016/j.jhazmat.2017.03.008

177	J	Garcia-Gomez, Concepcion; Obrador, Ana; Gonzalez, Demetrio; Babin, Mar; Dolores Fernandez, Maria	Comparative study of the phytotoxicity of ZnO nanoparticles and Zn accumulation in nine crops grown in a calcareous soil and an acidic soil	Article		Sci. Total Environ.	2018	10.1016/j.scitotenv.2018.06.356
178	J	Tanveer, Yashfa; Yasmin, Humaira; Nosheen, Asia; Ali, Sajad; Ahmad, Ajaz	Ameliorative effects of plant growth promoting bacteria, zinc oxide nanoparticles and oxalic acid on <i>Luffa acutangula</i> grown on arsenic enriched soil	Article		Environ. Pollut.	2022	10.1016/j.envpol.2022.118889
179	J	Siani, Narges Ghasemi; Fallah, Seyfollah; Pokhrel, Lok Raj; Rostamnejadi, Ali	Natural amelioration of zinc oxide nanoparticle toxicity in fenugreek ( <i>Trigonella foenum-gracum</i> ) by arbuscular mycorrhizal ( <i>Glomus intraradices</i> ) secretion of glomalin	Article		Plant Physiol. Biochem.	2017	10.1016/j.plaphy.2017.01.001
180	J	Malandrakis, Anastasios A.; Kavroulakis, Nektarios; Avramidou, Marianna; Papadopoulou, Kalliope K.; Tsaniklidis, Georgios; Chrysikopoulos, Constantinos, V	Metal nanoparticles: Phytotoxicity on tomato and effect on symbiosis with the <i>Fusarium solani</i> FsK strain	Article		Sci. Total Environ.	2021	10.1016/j.scitotenv.2021.147606
181	J	Ebbs, Stephen D.; Bradfield, Scott J.; Kumar, Pawan; White, Jason C.; Ma, Xingmao	Projected dietary intake of zinc, copper, and cerium from consumption of carrot ( <i>Daucus carota</i> ) exposed to metal oxide nanoparticles or metal ions	Article		Front. Plant Sci.	2016	10.3389/fpls.2016.00188
182	J	Ghosh, Manosij; Jana, Aditi; Sinha, Sonali; Jothiramajayam, Manivannan; Nag, Anish; Chakraborty, Anirban; Mukherjee, Amitava; Mukherjee, Anita	Effects of ZnO nanoparticles in plants: Cytotoxicity, genotoxicity, deregulation of antioxidant defenses, and cell-cycle arrest	Article		Mutat. Res. Genet. Toxicol. Environ. Mutagen.	2016	10.1016/j.mrgentox.2016.07.006
183	J	Li, Yuzhan; Liang, Luxin; Li, Wu; Ashraf, Umair; Ma, Lin; Tang, Xiangru; Pan, Shenggang; Tian, Hua; Mo, Zhaowen	ZnO nanoparticle-based seed priming modulates early growth and enhances physio-biochemical and metabolic profiles of fragrant rice against cadmium toxicity	Article		J. Nanobiotechnol.	2021	10.1186/s12951-021-00820-9
184	J	Zafar, Hira; Ali, Attarad; Ali, Joham S.; Haq, Ihsan U.; Zia, Muhammad	Effect of ZnO nanoparticles on <i>Brassica nigra</i> seedlings and stem explants: Growth dynamics and antioxidative response	Article		Front. Plant Sci.	2016	10.3389/fpls.2016.00535



185	J	Rizwan, Muhammad; Ali, Shafaqat; Rehman, Muhammad Zia Ur; Adrees, Muhammad; Arshad, Muhammad; Qayyum, Muhammad Farooq; Ali, Liaqat; Hussain, Afzal; Chatha, Shahzad Ali Shahid; Imran, Muhammad	Alleviation of cadmium accumulation in maize ( <i>Zea mays</i> L.) by foliar spray of zinc oxide nanoparticles and biochar to contaminated soil	Article		Environ. Pollut.	2019	10.1016/j.envpol.2019.02.031
186	J	Adrees, Muhammad; Khan, Zahra Saeed; Hafeez, Muhammad; Rizwan, Muhammad; Hussain, Khalid; Asrar, Muhammad; Alyemni, Mohammed Nasser; Wijaya, Leonard; Ali, Shafaqat	Foliar exposure of zinc oxide nanoparticles improved the growth of wheat ( <i>Triticum aestivum</i> L.) and decreased cadmium concentration in grains under simultaneous Cd and water deficient stress	Article		Ecotox. Environ. Safe.	2021	10.1016/j.ecoenv.2020.111627
187	J	Laura Lopez-Moreno, Martha; de la Rosa, Guadalupe; Cruz-Jimenez, Gustavo; Castellano, Laura; Peralta-Videa, Jose R.; Gardea-Torresdey, Jorge L.	Effect of ZnO nanoparticles on corn seedlings at different temperatures; X-ray absorption spectroscopy and ICP/OES studies	Article		Microchem J.	2017	10.1016/j.microc.2017.05.007
188	J	Komatsu, Setsuko; Murata, Kazuki; Yakeishi, Sayuri; Shimada, Kazuyuki; Yamaguchi, Hisateru; Hitachi, Keisuke; Tsuchida, Kunihiro; Obi, Rumina; Akita, Shoichi; Fukuda, Ryo	Morphological and proteomic analyses of soybean seedling interaction mechanism affected by fiber crosslinked with zinc-oxide nanoparticles	Article		Int. J. Mol. Sci.	2022	10.3390/ijms23137415
189	J	da Cruz, Tatiana N. M.; Savassa, Susilaine M.; Montanha, Gabriel S.; Ishida, Juliane K.; de Almeida, Eduardo; Tsai, Siu M.; Lavres Junior, Jose; Pereira de Carvalho, Hudson W.	A new glance on root-to-shoot in vivo zinc transport and time-dependent physiological effects of ZnSO <sub>4</sub> and ZnO nanoparticles on plants	Article		Sci Rep	2019	10.1038/s41598-019-46796-3
190	J	Hussain, Afzal; Ali, Shafaqat; Rizwan, Muhammad; Rehman, Muhammad Zia ur; Javed,	Zinc oxide nanoparticles alter the wheat physiological response and reduce the cadmium uptake by plants	Article		Environ. Pollut.	2018	10.1016/j.envpol.2018.08.036

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191	J	Sun, Liangliang; Wang, Ruting; Ju, Qiong; Xing, Menglu; Li, Ruishan; Li, Weimin; Li, Wen; Wang, Wenying; Deng, Yanfang; Xu, Jin	Mitigation mechanism of zinc oxide nanoparticles on cadmium toxicity in tomato	Article		Front. Plant Sci.	2023 10.3389/fpls.2023.1162372
192	J	Savassa, Susilaine M.; Duran, Nadia M.; Rodrigues, Eduardo S.; de Almeida, Eduardo; van Gestel, Cornelis A. M.; Bompadre, Thiago F. V.; de Carvalho, Hudson W. P.	Effects of ZnO nanoparticles on <i>Phaseolus vulgaris</i> germination and seedling development determined by X-ray spectroscopy	Article		ACS Appl. Nano Mater.	2018 10.1021/acsanm.8b01619
193	J	Mahfooz, Sadaf; Jahan, Sadaf; Shamim, Adeeba; Husain, Arbab; Farooqui, Alvina	Oxidative stress and response of antioxidant system in <i>Nostoc muscorum</i> exposed to different forms of zinc	Article		Turk. J. Biochem.	2018 10.1515/tjb-2017-0236
194	J	Mahawar, Himanshu; Prasanna, Radha; Simranjit, Kaur; Thapa, Shobit; Kanchan, Amrita; Singh, Rajendra; Kaushik, Suresh Chand; Singh, Surender; Nain, Lata	Deciphering the mode of interactions of nanoparticles with mung bean ( <i>Vigna radiata</i> L.)	Article		Isr. J. Plant Sci.	2018 10.1080/07929978.2017.1288516
195	J	Szymanski, Marcin; Dobrucka, Renata	Application of phytotests to study of environmental safety of biologically synthesised Au and Au/ZnO nanoparticles using <i>Tanacetum parthenium</i> extract	Article		J. Inorg. Organomet. Polym. Mater.	2022 10.1007/s10904-021-02188-7
196	J	Josko, Izabela; Oleszczuk, Patryk	Influence of soil type and environmental conditions on ZnO, TiO <sub>2</sub> and Ni nanoparticles phytotoxicity	Article		Chemosphere	2013 10.1016/j.chemosphere.2013.02.048
197	J	Rani, Simran; Kumar, Pradeep; Dahiya, Priyanka; Dang, Amita Suneja; Suneja, Pooja	Biogenic synthesis of zinc nanoparticles, their applications, and toxicity prospects	Review		Front. Microbiol.	2022 10.3389/fmicb.2022.824427
198	J	Prakash, Ved; Rai, Padmaja; Sharma, Nilesh C.; Singh,	Application of zinc oxide nanoparticles as fertilizer boosts growth in rice plant	Article		Chemosphere	2022 10.1016/j.chemosphere.2022.134554

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199	J	Janani, B.; Raju, Lija L.; Thomas, Ajith M.; Alyemni, Mohammed Nasser; Dudin, Gani Asa; Wijaya, Leonard; Alsahli, Abdulaziz Abdullah; Ahmad, Parvaiz; Khan, S. Sudheer	Impact of bovine serum albumin - A protein corona on toxicity of ZnO NPs in environmental model systems of plant, bacteria, algae and crustaceans	Article		Chemosphere	2021	10.1016/j.chemosphere.2020.12.8629
200	J	Kalcikova, Gabriela; Marolt, Gregor; Kokalj, Anita Jemec; Gotvajn, Andreja Zgajnar	The use of multiwell culture plates in the duckweed toxicity test-A case study on Zn nanoparticles	Article; Proceedings Paper	4th International Conference on Implementation of Microreactor Technology in Biotechnology (IMTB)	New Biotech.	2018	10.1016/j.nbt.2018.06.002
201	J	Zeeshan, Muhammad; Hu, Yu Xin; Iqbal, Anas; Salam, Abdul; Liu, Yong Xin; Muhammad, Ihsan; Ahmad, Shakeel; Khan, Aamir Hamid; Hale, Brett; Wu, Hai Yan; Zhou, Xun Bo	Amelioration of AsV toxicity by concurrent application of ZnO-NPs and Se-NPs is associated with differential regulation of photosynthetic indexes, antioxidant pool and osmolytes content in soybean seedling	Article		Ecotox. Environ. Safe.	2021	10.1016/j.ecoenv.2021.112738
202	J	Du, Jingjing; Qv, Wenrui; Niu, Yulong; Yuan, Shuaikang; Zhang, Lingyan; Yang, Huilian; Zhang, Yuyan	Co-exposures of acid rain and ZnO nanoparticles accelerate decomposition of aquatic leaf litter	Article		J. Hazard. Mater.	2022	10.1016/j.jhazmat.2021.128141
203	J	Xiang, Lei; Zhao, Hai-Ming; Li, Yan-Wen; Huang, Xian-Pei; Wu, Xiao-Lian; Zhai, Teng; Yuan, Yue; Cai, Quan-Ying; Mo, Ce-Hui	Effects of the size and morphology of zinc oxide nanoparticles on the germination of Chinese cabbage seeds	Article		Environ. Sci. Pollut. Res.	2015	10.1007/s11356-015-4172-9
204	J	Yadav, Ravi Kumar; Singh, N. B.; Singh, Ajey; Yadav, Vijaya; Niharika; Khare, Shubhra; Azim, Zeba	Role of bio-based synthesized nanozinc oxide in ameliorating the deleterious effects caused by lead in <i>Vigna radiata</i> L	Article		Appl. Biochem. Biotechnol.	2022	10.1007/s12010-022-03801-2

205	J	Arfaoui, Hiba; Karmous, Ines; Mahjoubi, Yethreb; Kharbech, Oussama; Tlahig, Samir; Loumerem, Mohammed; Chaoui, Abdelilah	Screening of the effects of zinc oxide based nanofertilizers on the germination of <i>Lathyrus sativa</i> L. seeds	Article		J. Appl. Bot. Food Qual.	2021	10.5073/JABFQ.2021.094.007
206	J	Khan, Muhammad Ali; Yasmin, Humaira; Shah, Zafar Abbas; Rinklebe, Joerg; Alyemeni, Mohammed Nasser; Ahmad, Parvaiz	Co application of biofertilizer and zinc oxide nanoparticles upregulate protective mechanism culminating improved arsenic resistance in maize	Article		Chemosphere	2022	10.1016/j.chemosphere.2022.133796
207	J	Anderson, Anne J.; McLean, Joan E.; Jacobson, Astrid R.; Britt, David W.	CuO and ZnO nanoparticles modify interkingdom cell signaling processes relevant to crop production	Article; Proceedings Paper	1st International Conference on Nanotechnology Applications and Implications of Agrochemicals toward Sustainable Agriculture and Food Systems	J. Agric. Food Chem.	2018	10.1021/acs.jafc.7b01302
208	J	Saeed, Faryal; Younas, Muhammad; Fazal, Hina; Mushtaq, Sadaf; Rahman, Faiz Ur; Shah, Muzamil; Anjum, Sumaira; Ahmad, Nisar; Ali, Mohammad; Hano, Christophe; Abbasi, Bilal Haider	Green and chemically synthesized zinc oxide nanoparticles: Effects on in-vitro seedlings and callus cultures of <i>Silybum marianum</i> and evaluation of their antimicrobial and anticancer potential	Article		Artif. Cell. Nanomed. Biotechnol.	2021	10.1080/21691401.2021.1926274
209	J	Martins, Natercia C. T.; Avellan, Astrid; Rodrigues, Sandra; Salvador, Diana; Rodrigues, Sonia M.; Trindade, Tito	Composites of biopolymers and ZnO NPs for controlled release of zinc in agricultural soils and timed delivery for maize	Article		ACS Appl. Nano Mater.	2020	10.1021/acsanm.9b01492
210	J	Elshoky, Hisham A.; Yotsova, Ekaterina;	Impact of foliar spray of zinc oxide nanoparticles on the photosynthesis of	Article		Plant Physiol. Biochem.	2021	10.1016/j.plaphy.2021.08.039

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211	J	Wei, Xuemin; Cao, Pei; Wang, Gang; Liu, Yang; Song, Jingyuan; Han, Jianping	CuO, ZnO, and gamma-Fe <sub>2</sub> O <sub>3</sub> nanoparticles modified the underground biomass and rhizosphere microbial community of <i>Salvia miltiorrhiza</i> (Bge.) after 165-day exposure	Article		Ecotox. Environ. Safe.	2021	10.1016/j.ecoenv.2021.112232
212	J	Sun, Shiqing; Li, Xiuling; Sun, Chen; Cao, Weixing; Hu, Changwei; Zhao, Yongjun; Yang, Aoao	Effects of ZnO nanoparticles on the toxicity of cadmium to duckweed <i>Lemna minor</i>	Article		Sci. Total Environ.	2019	10.1016/j.scitotenv.2019.01.275
213	J	Afzal, Shadma; Aftab, Tariq; Singh, Nand K.	Impact of zinc oxide and iron oxide nanoparticles on uptake, translocation, and physiological effects in <i>Oryza sativa</i> L.	Article		J. Plant Growth Regul.	2022	10.1007/s00344-021-10388-1
214	J	Nalci, Ozge Balpınar; Nadaroglu, Hayrunnisa; Pour, Arash Hossein; Gungor, Azize Alayli; Haliloglu, Kamil	Effects of ZnO, CuO and -Fe <sub>3</sub> O <sub>4</sub> nanoparticles on mature embryo culture of wheat ( <i>Triticum aestivum</i> L.)	Article		Plant Cell Tissue Organ Cult.	2019	10.1007/s11240-018-1512-8
215	J	Hussain, Afzal; Rizwan, Muhammad; Ali, Shafaqat; Rehman, Muhammad Zia ur; Qayyum, Muhammad Farooq; Nawaz, Rab; Ahmad, Awais; Asrar, Muhammad; Ahmad, Sajid Rashid; Alsahli, Abdulaziz Abdullah; Alyemini, Mohammed Nasser	Combined use of different nanoparticles effectively decreased cadmium (Cd) concentration in grains of wheat grown in a field contaminated with Cd	Article		Ecotox. Environ. Safe.	2021	10.1016/j.ecoenv.2021.112139
216	J	Nair, Prakash M. Gopalakrishnan; Chung, Ill Min	Regulation of morphological, molecular and nutrient status in <i>Arabidopsis thaliana</i> seedlings in response to ZnO nanoparticles and Zn ion exposure	Article		Sci. Total Environ.	2017	10.1016/j.scitotenv.2016.10.017
217	J	Stewart, Jacob; Hansen, Trevor; McLean, Joan E.;	Salts affect the interaction of ZnO or CuO nanoparticles with wheat	Article		Environ. Toxicol. Chem.	2015	10.1002/etc.3037

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218	J	Das, Debadrito; Datta, Animesh Kumar; Kumbhakar, Divya Vishambhar; Ghosh, Bapi; Pramanik, Ankita; Gupta, Sudha; Mandal, Aninda	Assessment of photocatalytic potentiality and determination of ecotoxicity (using plant model for better environmental applicability) of synthesized copper, copper oxide and copper-doped zinc oxide nanoparticles	Article		PLoS One	2017	10.1371/journal.pone.0182823
219	J	Ahmed, Bilal; Rizvi, Asfa; Syed, Asad; Elgorban, Abdallah M.; Khan, Mohammad Saghir; AL-Shwaiman, Hind A.; Musarrat, Javed; Lee, Jintae	Differential responses of maize ( <i>Zea mays</i> ) at the physiological, biomolecular, and nutrient levels when cultivated in the presence of nano or bulk ZnO or CuO or Zn <sup>2+</sup> or Cu <sup>2+</sup> ions	Article		J. Hazard. Mater.	2021	10.1016/j.jhazmat.2021.126493
220	J	Dobrucka, Renata; Szymanski, Marcin; Przekop, Robert	Phytotoxic effects of biosynthesized ZnO nanoparticles using <i>Betonica officinalis</i> extract	Article		Environ. Technol.	2021	10.1080/09593330.2020.1740331
221	J	Adele, Nyekachi C.; Ngwenya, Bryne T.; Heal, Kate V.; Mosselmans, J. Frederick W.	Soil bacteria override speciation effects on zinc phytotoxicity in zinc-contaminated soils	Article		Environ. Sci. Technol.	2018	10.1021/acs.est.7b05094
222	J	El-Badri, Ali M. A.; Batool, Maria; Mohamed, Ibrahim A. A.; Khatab, Ahmed; Sherif, Ahmed; Wang, Zongkai; Salah, Akram; Nishawy, Elsayed; Ayaad, Mohammed; Kuai, Jie; Wang, Bo; Zhou, Guangsheng	Modulation of salinity impact on early seedling stage via nano-priming application of zinc oxide on rapeseed ( <i>Brassica napus</i> L.)	Article		Plant Physiol. Biochem.	2021	10.1016/j.plaphy.2021.05.040
223	J	Wan, Jinpeng; Wang, Ruting; Wang, Ruling; Ju, Qiong; Wang, Yibo; Xu, Jin	Comparative physiological and transcriptomic analyses reveal the toxic effects of ZnO nanoparticles on plant growth	Article		Environ. Sci. Technol.	2019	10.1021/acs.est.8b06641
224	J	Jahantab, Esfandiar; Farzadmehr, Jalil; Matinkhah, SayedHamid; Abadi, Nikoo Taheri Mohammad; Shafeiyan, Elham; Yazdanshenas,	Effect of metal oxide nanoparticles on the activity of glutathione reductase, catalase, peroxidase and superoxide dismutase in plants under drought	Article		Irrig. Drain.	2022	10.1002/ird.2739

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225	J	Reddy, P. Venkata Laxma; Hernandez-Viezcas, J. A.; Peralta-Videa, J. R.; Gardea-Torresdey, J. L.	Lessons learned: Are engineered nanomaterials toxic to terrestrial plants?	Review		Sci. Total Environ.	2016	10.1016/j.scitotenv.2016.06.042
226	J	Troppova, Ivana; Matejova, Lenka; Sezimova, Hana; Matej, Zdenek; Peikertova, Pavlina; Lang, Jaroslav	Nanostructured TiO <sub>2</sub> and ZnO prepared by using pressurized hot water and their eco-toxicological evaluation	Article		J. Nanopart. Res.	2017	10.1007/s11051-017-3877-8
227	J	Boddupalli, Anuraag; Tiwari, Rameshwar; Sharma, Anamika; Singh, Surender; Prasanna, Radha; Nain, Lata	Elucidating the interactions and phytotoxicity of zinc oxide nanoparticles with agriculturally beneficial bacteria and selected crop plants	Article		Folia Microbiol.	2017	10.1007/s12223-017-0495-x
228	J	Czyzowska, Agnieszka; Barbasz, Anna	A review: Zinc oxide nanoparticles - friends or enemies?	Review		Int. J. Environ. Health Res.	2022	10.1080/09603123.2020.1805415
229	J	Asztemborska, Monika; Bembenek, Marcin; Jakubiak, Malgorzata; Steborowski, Romuald; Bystrzejewska-Piotrowska, Grazyna	The effect of nanoparticles with sorption capacity on the bioaccumulation of divalent ions by aquatic plants	Article		Int. J. Environ. Res.	2018	10.1007/s41742-018-0087-x
230	J	Dogaroglu, Zeynep G.	Role of EDDS and ZnO-nanoparticles in wheat exposed to TiO <sub>2</sub> Ag-nanoparticles	Article		Arch. Environ. Prot.	2019	10.24425/aep.2019.130244
231	J	Emamverdian, Abolghassem; Ding, Yulong; Hasanuzzaman, Mirza; Barker, James; Liu, Guohua; Li, Yang; Mokhberdoran, Farzad	Insight into the biochemical and physiological mechanisms of nanoparticles-induced arsenic tolerance in bamboo	Article		Front. Plant Sci.	2023	10.3389/fpls.2023.1121886
232	J	Anik, Touhidur Rahman; Mostofa, Mohammad Golam; Rahman, Mezanur; Khan, Arifur Rahman; Ghosh, Protik Kumar; Sultana, Sharmin; Das, Ashim Kumar; Hossain, Saddam; Keya, Sanjida Sultana; Rahman, Abiar; Jahan, Nusrat; Gupta, Aarti;	Zn supplementation mitigates drought effects on cotton by improving photosynthetic performance and antioxidant defense mechanisms	Article		Antioxidants	2023	10.3390/antiox12040854

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233	J	Singh, Priyanka; Arif, Yamshi; Siddiqui, Husna; Sami, Fareen; Zaidi, Rumman; Azam, Ameer; Alam, Pravej; Hayat, Shamsul	Nanoparticles enhances the salinity toxicity tolerance in <i>Linum usitatissimum</i> L. by modulating the antioxidative enzymes, photosynthetic efficiency, redox status and cellular damage	Article		Ecotox. Environ. Safe.	2021	10.1016/j.ecoenv.2021.112020
234	J	Garcia-Lopez, Josue I.; Zavala-Garcia, Francisco; Olivares-Saenz, Emilio; Lira-Saldivar, Ricardo H.; Diaz Barriga-Castro, Enrique; Ruiz-Torres, Norma A.; Ramos-Cortez, Edith; Vazquez-Alvarado, Rigoberto; Nino-Medina, Guillermo	Zinc oxide nanoparticles boosts phenolic compounds and antioxidant activity of <i>Capsicum annuum</i> L. during germination	Article		Agronomy-Basel	2018	10.3390/agronomy8100215
235	J	Khan, Ali Raza; Azhar, Wardah; Wu, Junyu; Ulhassan, Zaid; Salam, Abdul; Zaidi, Syed Hassan Raza; Yang, Shuaiqi; Song, Ge; Gan, Yinbo	Ethylene participates in zinc oxide nanoparticles induced biochemical, molecular and ultrastructural changes in rice seedlings	Article		Ecotox. Environ. Safe.	2021	10.1016/j.ecoenv.2021.112844
236	J	Shome, Soumitra; Tewari, Sujit; Bhattacharya, Mrinal Kanti; Panda, Sanjib Kumar; Upadhyaya, Hrishikesh	Phytofunctionalized ZnO nanoparticles ameliorate water stress and its recovery in <i>Oryza sativa</i> L.	Article		Acta Physiol. Plant.	2022	10.1007/s11738-022-03477-5
237	J	Baskar, Venkidasamy; Nayeem, Safia; Kuppuraj, Sree Preethy; Muthu, Thiruvengadam; Ramalingam, Sathishkumar	Assessment of the effects of metal oxide nanoparticles on the growth, physiology and metabolic responses in in vitro grown eggplant ( <i>Solanum melongena</i> )	Article		3 Biotech	2018	10.1007/s13205-018-1386-9
238	J	Ahmed, Bilal; Dwivedi, Sourabh; Abdin, Malik Zainul; Azam, Ameer; Al-Shaeri, Majed; Khan, Mohammad Saghir; Saquib, Quaiser; Al-Khedhairi, Abdulaziz A.; Musarrat, Javed	Mitochondrial and chromosomal damage induced by oxidative stress in Zn <sup>2+</sup> ions, ZnO-bulk and ZnO-NPs treated <i>Allium cepa</i> roots	Article		Sci Rep	2017	10.1038/srep40685
239	J	Sorahinobar, Mona; Deldari,	Effect of zinc nanoparticles on the	Article		Biologia	2023	10.1007/s11756-022-01269-3



		Tooba; Nazem Bokaei, Zahra; Mehdinia, Ali	growth and biofortification capability of mungbean ( <i>Vigna radiata</i> ) seedlings					
240	J	Ghoto, Kabir; Shen, Zhi-Jun; Simon, Martin; Gao, Gui-Feng; Wei, Ming-Yue; Zheng, Hai-Lei	Maize seedling root exudation, growth and physiological alterations induced by the toxicity of zinc oxide nanoparticles	Article		Pak. J. Agric. Sci.	2022	10.21162/PAKJAS/22.1063
241	J	Azhar, Beenish J.; Noor, Asma; Zulfiqar, Alveena; Zeenat, Asyia; Ahmad, Shakeel; Chishti, Iqbal; Abbas, Zehra; Shakeel, Samina N.	Effect of ZnO, SiO <sub>2</sub> and composite nanoparticles on <i>Arabidopsis thaliana</i> and involvement of ethylene and cytokinin signaling pathways	Article		Pak. J. Bot.	2021	10.30848/PJB2021-2(40)
242	J	Pereira, Flavia F.; Paris, Elaine C.; Bresolin, Joana D.; Mitsuyuki, Milene C.; Ferreira, Marcos D.; Correa, Daniel S.	The effect of ZnO nanoparticles morphology on the toxicity towards microalgae <i>Pseudokirchneriella subcapitata</i>	Article		J. Nanosci. Nanotechnol.	2020	10.1166/jnn.2020.16880
243	J	Aravantinou, Andriana F.; Andreou, Fytoula; Manariotis, Ioannis D.	Long-term toxicity of ZnO nanoparticles to <i>Scenedesmus rubescens</i> cultivated in different media	Article		Sci Rep	2017	10.1038/s41598-017-13517-7
244	J	Chemingui, Hajer; Smiri, Moez; Missaoui, Takwa; Hafiane, Amor	Zinc oxide nanoparticles induced oxidative stress and changes in the photosynthetic apparatus in fenugreek ( <i>Trigonella foenum graecum</i> L.)	Article		Bull. Environ. Contam. Toxicol.	2019	10.1007/s00128-019-02590-5
245	J	Fazelian, Nasrin; Yousefzadi, Morteza; Movafeghi, Ali	Algal response to metal oxide nanoparticles: Analysis of growth, protein content, and fatty acid composition	Article		BioEnergy Res.	2020	10.1007/s12155-020-10099-7
246	J	Cheng, Yongchao; Cheng, Yuxuan; Zheng, Han; Song, Yaxin; Li, Ruizhe; Wan, Fengting; Li, Junli	Evaluation and comparison of the toxic effects of MgO NPs, ZnO NPs, alpha-Fe <sub>2</sub> O <sub>3</sub> NPs, gamma-Fe <sub>2</sub> O <sub>3</sub> NPs, and Fe <sub>3</sub> O <sub>4</sub> NPs on the remediation for cadmium-related effects in wheat seedlings	Article		Water Air Soil Pollut.	2020	10.1007/s11270-020-04834-1
247	J	Javed, Rabia; Usman, Muhammad; Yucesan, Buhara; Zia, Muhammad; Gurel, Ekrem	Effect of zinc oxide (ZnO) nanoparticles on physiology and steviol glycosides production in micropropagated shoots of <i>Stevia rebaudiana</i> Bertoni	Article		Plant Physiol. Biochem.	2017	10.1016/j.plaphy.2016.05.032
248	J	Qiao Jin; Xu Chang-shan; Zhang Hai-jiao; Shao Hai-ling; Zheng Bo-wen; He Hui-min	Effects of ZnO NPs on the photosynthetic processes of <i>Egeria najas</i>	Article		Spectrosc. Spectr. Anal.	2019	10.3964/j.issn.1000-0593(2019)05-1495-08

249	J	Noohpisheh, Zahra; Amiri, Hamzeh; Mohammadi, Abdolnaser; Farhadi, Saeed	Effect of the foliar application of zinc oxide nanoparticles on some biochemical and physiological parameters of <i>Trigonella foenum-graecum</i> under salinity stress	Article		Plant Biosyst.	2021	10.1080/11263504.2020.1739160
250	J	Yin, Jianan; Huang, Guohe; An, Chunjiang; Feng, Renfei	Nanocellulose enhances the dispersion and toxicity of ZnO NPs to green algae <i>Eremosphaera viridis</i>	Article		Environ. Sci.: Nano	2022	10.1039/d1en00881a
251	J	Shah, Ghulam Mustafa; Ali, Hifsa; Ahmad, Iftikhar; Kamran, Muhammad; Hammad, Mohkum; Shah, Ghulam Abbas; Bakhat, Hafiz Faiq; Waqar, Atika; Guo, Jianbin; Dong, Renjie; Rashid, Muhammad Imtiaz	Nano agrochemical zinc oxide influences microbial activity, carbon, and nitrogen cycling of applied manures in the soil-plant system	Article		Environ. Pollut.	2022	10.1016/j.envpol.2021.118559
252	J	Singh, Divya; Kumar, Arun	Assessment of toxic interaction of nano zinc oxide and nano copper oxide on germination of <i>Raphanus sativus</i> seeds	Article		Environ. Monit. Assess.	2019	10.1007/s10661-019-7902-5
253	J	Rahimzadeh, Saeedeh; Ghassemi-Golezani, Kazem	Biochar-based nutritional nanocomposites altered nutrient uptake and vacuolar H <sup>+</sup> -pump activities of dill under salinity	Article		J. Soil Sci. Plant Nutr.	2022	10.1007/s42729-022-00910-z
254	C	Sunita; Tripathy, Suraj Kumar	Environmental effect of ZnO and CuOnp's on growth and tissue specific accumulation in <i>Brassica juncea</i>	Proceedings Paper	National Conference on Nanotechnology and Renewable Energy (NCNRE)	Adv. Sci. Lett.	2014	10.1166/asl.2014.5584
255	J	Radi, Abeer A.; Farghaly, Fatma A.; Al-Kahtany, Fatma A.; Hamada, Afaf M.	Zinc oxide nanoparticles-mediated changes in ultrastructure and macromolecules of pomegranate callus cells	Article		Plant Cell Tissue Organ Cult.	2018	10.1007/s11240-018-1460-3
256	J	Josko, Izabela; Oleszczuk, Patryk; Skwarek, Ewa	Toxicity of combined mixtures of nanoparticles to plants	Article		J. Hazard. Mater.	2017	10.1016/j.jhazmat.2017.02.028
257	J	Kong, In Chul; Ko, Kyung-Seok; Koh, Dong-Chan	Comparisons of the effect of different metal oxide nanoparticles on the root and shoot growth under shaking and non-shaking incubation, different plants, and binary mixture conditions	Article		Nanomaterials	2021	10.3390/nano11071653

258	J	Ahmed, Mohamed F.; Ibrahim, Mostafa A.; Mansour, Ahmed S.; Emam, Ahmed N.; Abd El-Razik, Ashraf B.; Tawfik, Eman	Metal-based-oxide nanoparticles assisted the in vitro culture growth of <i>Populus alba</i> as micronutrients: Essential metabolic processes and genetic stability	Article		RSC Adv.	2023	10.1039/d2ra05941j
259	J	Seleiman, Mahmoud F.; Alotaibi, Majed A.; Alhammad, Bushra Ahmed; Alharbi, Basmah M.; Refay, Yahya; Badawy, Shima A.	Effects of ZnO nanoparticles and biochar of rice straw and cow manure on characteristics of contaminated soil and sunflower productivity, oil quality, and heavy metals uptake	Article		Agronomy-Basel	2020	10.3390/agronomy10060790
260	J	Zhu, Jiahui; Wang, Jia; Zhan, Xinhua; Li, Aoze; White, Jason C.; Gardea-Torresdey, Jorge L.; Xing, Baoshan	Role of charge and size in the translocation and distribution of zinc oxide particles in wheat cells	Article		ACS Sustain. Chem. Eng.	2021	10.1021/acssuschemeng.1c04080
261	J	Spano, Carmelina; Bottega, Stefania; Bellani, Lorenza; Muccifora, Simonetta; Sorce, Carlo; Ruffini Castiglione, Monica	Effect of zinc priming on salt response of wheat seedlings: Relieving or worsening?	Article		Plants-Basel	2020	10.3390/plants9111514
262	J	Dogaroglu, Z. G.; Koleli, N.	Effects of TiO <sub>2</sub> and ZnO nanoparticles on germination and antioxidant system of wheat ( <i>Triticum aestivum</i> L.)	Article		Appl. Ecol. Environ. Res.	2017	10.15666/aeer/1503_14991510
263	J	Ahmad, Shoaib; Mfarrej, Manar Fawzi Bani; El-Esawi, Mohamed A.; Waseem, Muhammad; Alatawi, Aishah; Nafees, Muhammad; Saleem, Muhammad Hamzah; Rizwan, Muhammad; Yasmeen, Tahira; Anayat, Alia; Ali, Shafaqat	Chromium-resistant <i>Staphylococcus aureus</i> alleviates chromium toxicity by developing synergistic relationships with zinc oxide nanoparticles in wheat	Article		Ecotox. Environ. Safe.	2022	10.1016/j.ecoenv.2021.113142
264	J	Bashir, Arooj; Rehman, Muhammad Zia Ur; Hussaini, Khalid Mahmud; Adrees, Muhammad; Qayyum, Muhammad Farooq; Sayal, Aziz Ullah; Rizwan, Muhammad; Ali, Shafaqat; Alsahli, Abdulaziz Abdullah; Alyemeni,	Combined use of zinc nanoparticles and co-composted biochar enhanced wheat growth and decreased Cd concentration in grains under Cd and drought stress: A field study	Article		Environ. Technol. Innov.	2021	10.1016/j.eti.2021.101518

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265	J	Sturikova, Helena; Krystofova, Olga; Huska, Dalibor; Adam, Vojtech	Zinc, zinc nanoparticles and plants	Article		J. Hazard. Mater.	2018	10.1016/j.jhazmat.2018.01.040
266	J	Zhu, Jiahui; Li, Jinfeng; Shen, Yu; Liu, Shiqi; Zeng, Nengde; Zhan, Xinhua; White, Jason C.; Gardea-Torresdey, Jorge; Xing, Baoshan	Mechanism of zinc oxide nanoparticle entry into wheat seedling leaves	Article		Environ. Sci.: Nano	2020	10.1039/d0en00658k
267	J	Song, Yue; Wang, Binqiang; Qiu, Dengying; Xie, Zhenming; Dai, Shang; Li, Chao; Xu, Shouling; Zheng, Yunchao; Li, Shan; Jiang, Meng	Melatonin enhances metallic oxide nanoparticle stress tolerance in rice via inducing tetrapyrrole biosynthesis and amino acid metabolism	Article		Environ. Sci.: Nano	2021	10.1039/d1en00244a
268	J	Salah, Sheteiwy Mohamed; Guan Yajing; Cao Dongdong; Li Jie; Aamir, Nawaz; Hu Qijuan; Hu Weimin; Ning Mingyu; Hu Jin	Seed priming with polyethylene glycol regulating the physiological and molecular mechanism in rice ( <i>Oryza sativa</i> L.) under nano-ZnO stress	Article		Sci Rep	2015	10.1038/srep14278
269	J	Ghassemi-Golezani, Kazem; Rahimzadeh, Saeedeh	Biochar-based nutritional nanocomposites: A superior treatment for alleviating salt toxicity and improving physiological performance of dill ( <i>Anethum graveolens</i> )	Article		Environ. Geochem. Health	2023	10.1007/s10653-022-01397-4
270	J	Ko, Kyung-Seok; Kong, In Chul	Toxic effects of nanoparticles on bioluminescence activity, seed germination, and gene mutation	Article		Appl. Microbiol. Biotechnol.	2014	10.1007/s00253-013-5404-x
271	J	Akanbi-Gada, Mariam Abiola; Ogunkunle, Clement O.; Vishwakarma, Vinita; Viswanathan, Kanagasabai; Fatoba, Paul O.	Phytotoxicity of nano-zinc oxide to tomato plant ( <i>Solanum lycopersicum</i> L.): Zn uptake, stress enzymes response and influence on non-enzymatic antioxidants in fruits	Article		Environ. Technol. Innov.	2019	10.1016/j.eti.2019.100325
272	J	Israel Garcia-Lopez, Josue; Hugo Lira-Saldivar, Ricardo; Zavala-Garcia, Francisco; Olivares-Saenz, Emilio; Nino-Medina, Guillermo; Angelica Ruiz-	Effects of zinc oxide nanoparticles on growth and antioxidant enzymes of <i>Capsicum chinense</i>	Article		Toxicol Environ. Chem.	2018	10.1080/02772248.2018.1550781

		Torres, Norma; Mendez-Arguecello, Bulmaro; Diaz-Barriga, Enrique						
273	J	Singh, Divya; Kumar, Arun	Impact of irrigation using water containing CuO and ZnO nanoparticles on <i>Spinach oleracea</i> grown in soil media	Article		Bull. Environ. Contam. Toxicol.	2016	10.1007/s00128-016-1872-x
274	J	Wu, Fan; Fang, Qing; Yan, Shiwei; Pan, Ling; Tang, Xianjin; Ye, Wenling	Effects of zinc oxide nanoparticles on arsenic stress in rice ( <i>Oryza sativa</i> L.): Germination, early growth, and arsenic uptake	Article		Environ. Sci. Pollut. Res.	2020	10.1007/s11356-020-08965-0
275	J	Esper Neto, Michel; Britt, David W.; Lara, Lorena Moreira; Cartwright, Anthony; dos Santos, Rayssa Fernanda; Inoue, Tadeu Takeyoshi; Batista, Marcelo Augusto	Initial development of corn seedlings after seed priming with nanoscale synthetic zinc oxide	Article		Agronomy-Basel	2020	10.3390/agronomy10020307
276	J	Amooaghaie, Rayhaneh; Norouzi, Maryam; Saeri, Mohammad	Impact of zinc and zinc oxide nanoparticles on the physiological and biochemical processes in tomato and wheat	Article		Botany	2017	10.1139/cjb-2016-0194
277	J	Rizwan, Muhammad; Ali, Shafaqat; Ali, Basharat; Adrees, Muhammad; Arshad, Muhammad; Hussain, Afzal; Rehman, Muhammad Zia ur; Waris, Aisha Abdul	Zinc and iron oxide nanoparticles improved the plant growth and reduced the oxidative stress and cadmium concentration in wheat	Article		Chemosphere	2019	10.1016/j.chemosphere.2018.09.120
278	J	Hu, Changwei; Liu, Yimeng; Li, Xiuling; Li, Mei	Biochemical responses of duckweed ( <i>Spirodela polyrhiza</i> ) to zinc oxide nanoparticles	Article		Arch. Environ. Contam. Toxicol.	2013	10.1007/s00244-012-9859-z
279	J	Ramzan, Musarrat; Naz, Gul; Shah, Anis Ali; Parveen, Misbah; Jamil, Muhammad; Gill, Sidra; Sharif, Hafiz M. Adeel	Synthesis of phytostabilized zinc oxide nanoparticles and their effects on physiological and anti-oxidative responses of <i>Zea mays</i> (L.) under chromium stress	Article		Plant Physiol. Biochem.	2023	10.1016/j.plaphy.2023.01.015
280	J	Wang, Ruting; Sun, Liangliang; Zhang, Ping; Wan, Jinpeng; Wang, Yibo; Xu, Jin	Zinc oxide nanoparticles alleviate cadmium stress by modulating plant metabolism and decreasing cadmium accumulation in <i>Perilla frutescens</i>	Article		Plant Growth Regul.	2023	10.1007/s10725-022-00938-2

281	J	Vignati, Davide Anselmo Luigi; Lofrano, Giusy; Libralato, Giovanni; Guida, Marco; Siciliano, Antonietta; Carraturo, Federica; Carotenuto, Maurizio	Photocatalytic ZnO-assisted degradation of spiramycin in urban wastewater: Degradation kinetics and toxicity	Article		Water	2021	10.3390/w13081051
282	J	Shafqat, Usman; Hussain, Sabir; Shahzad, Tanvir; Shahid, Muhammad; Mahmood, Faisal	Elucidating the phytotoxicity thresholds of various biosynthesized nanoparticles on physical and biochemical attributes of cotton	Article		Chem. Biol. Technol. Agric.	2023	10.1186/s40538-023-00402-x
283	J	Voloshina, Marina; Rajput, Vishnu D.; Minkina, Tatiana; Vechkanov, Evgeniy; Mandzhieva, Saglara; Mazarji, Mahmoud; Churyukina, Ella; Plotnikov, Andrey; Krepakova, Maria; Wong, Ming Hung	Zinc oxide nanoparticles: Physiological and biochemical responses in barley ( <i>Hordeum vulgare</i> L.)	Article		Plants-Basel	2022	10.3390/plants11202759
284	J	Gottschalk, Fadri; Kost, Elias; Nowack, Bernd	Engineered nanomaterials in water and soils: A risk quantification based on probabilistic exposure and effect modeling	Article		Environ. Toxicol. Chem.	2013	10.1002/etc.2177
285	J	Khan, Zahra Saeed; Rizwan, Muhammad; Hafeez, Muhammad; Ali, Shafaqat; Javed, Muhammad Rizwan; Adrees, Muhammad	The accumulation of cadmium in wheat ( <i>Triticum aestivum</i> ) as influenced by zinc oxide nanoparticles and soil moisture conditions	Article		Environ. Sci. Pollut. Res.	2019	10.1007/s11356-019-05333-5
286	J	Chutipaijit, Sutee	Establishment of condition and nanoparticle factors influencing plant regeneration from aromatic rice ( <i>Oryza sativa</i> )	Article		Int. J. Agric. Biol.	2015	
287	J	Ahmed, Bilal; Syed, Asad; Rizvi, Asfa; Shahid, Mohammad; Bahkali, Ali H.; Khan, Mohammad Saghir; Musarrat, Javed	Impact of metal-oxide nanoparticles on growth, physiology and yield of tomato ( <i>Solanum lycopersicum</i> L.) modulated by <i>Azotobacter salinestris</i> strain ASM	Article		Environ. Pollut.	2021	10.1016/j.envpol.2020.116218
288	J	Josko, Izabela; Kusiak, Magdalena; Xing, Baoshan; Oleszczuk, Patryk	Combined effect of nano-CuO and nano-ZnO in plant-related system: From bioavailability in soil to transcriptional regulation of metal homeostasis in barley	Article		J. Hazard. Mater.	2021	10.1016/j.jhazmat.2021.126230

289	J	Liu, Yang; Baas, Jan; Peijnenburg, Willie J. G. M.; Vijver, Martina G.	Evaluating the combined toxicity of Cu and ZnO nanoparticles: Utility of the concept of additivity and a nested experimental design	Article		Environ. Sci. Technol.	2016	10.1021/acs.est.6b00614
290	J	Hidouri, Safa; Karmous, Ines; Kadri, Oumaima; Kharbech, Oussama; Chaoui, Abdelilah	Clue of zinc oxide and copper oxide nanoparticles in the remediation of cadmium toxicity in <i>Phaseolus vulgaris</i> L. via the modulation of antioxidant and redox systems	Article		Environ. Sci. Pollut. Res.	2022	10.1007/s11356-022-21799-2
291	J	Chen, Chun; Unrine, Jason M.; Judy, Jonathan D.; Lewis, Ricky W.; Guo, Jing; McNear, David H., Jr.; Tsyusko, Olga V.	Toxicogenomic responses of the model Legume <i>Medicago truncatula</i> to aged biosolids containing a mixture of nanomaterials (TiO <sub>2</sub> , Ag, and ZnO) from a pilot wastewater treatment plant	Article		Environ. Sci. Technol.	2015	10.1021/acs.est.5b01211
292	J	da Cruz, Tatiana N. M.; Savassa, Susilaine M.; Gomes, Marcos H. F.; Rodrigues, Eduardo S.; Duran, Nadia M.; de Almeida, Eduardo; Martinelli, Adriana P.; de Carvalho, Hudson W. P.	Shedding light on the mechanisms of absorption and transport of ZnO nanoparticles by plants via in vivo X-ray spectroscopy	Article		Environ. Sci.: Nano	2017	10.1039/c7en00785j
293	J	Debnath, Priyanka; Mondal, Arghadip; Sen, Kamalesh; Mishra, Debojyoti; Mondal, Naba Kumar	Genotoxicity study of nano Al <sub>2</sub> O <sub>3</sub> , TiO <sub>2</sub> and ZnO along with UV-B exposure: An <i>Allium cepa</i> root tip assay	Article		Sci. Total Environ.	2020	10.1016/j.scitotenv.2020.136592
294	J	Ahmed, Bilal; Rizvi, Asfa; Syed, Asad; Jailani, Afreen; Elgorban, Abdallah M.; Khan, Mohammad Saghir; Al-Shwaiman, Hind A.; Lee, Jintae	Differential bioaccumulations and ecotoxicological impacts of metal-oxide nanoparticles, bulk materials, and metal-ions in cucumbers grown in sandy clay loam soil	Article		Environ. Pollut.	2021	10.1016/j.envpol.2021.117854
295	J	Bashir, Arooj; Rizwan, Muhammad; Ali, Shafaqat; Adrees, Muhammad; Rehman, Muhammad Zia ur; Qayyum, Muhammad Farooq	Effect of composted organic amendments and zinc oxide nanoparticles on growth and cadmium accumulation by wheat; a life cycle study	Article		Environ. Sci. Pollut. Res.	2020	10.1007/s11356-020-08739-8
296	J	Ross, Shailise S.; Owen, Matthew J.; Pedersen, Brian P.; Liu, Gang-yu; Miller, William J. W.	Using mung beans as a simple, informative means to evaluate the phytotoxicity of engineered nanomaterials and introduce the concept	Article		J. Chem. Educ.	2016	10.1021/acs.jchemed.5b01038

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297	J	Jiang, Meng; Wang, Jiakuan; Rui, Mengmeng; Yang, Lijia; Shen, Jun; Chu, Huangwei; Song, Shiyong; Chen, Ying	OsFTIP7 determines metallic oxide nanoparticles response and tolerance by regulating auxin biosynthesis in rice	Article		J. Hazard. Mater.	2021	10.1016/j.jhazmat.2020.123946
298	J	Nath, Jayashree; Dror, Ishai; Landa, Premysl; Vanek, Tomas; Kaplan-Ashiri, Ifat; Berkowitz, Brian	Synthesis and characterization of isotopically-labeled silver, copper and zinc oxide nanoparticles for tracing studies in plants	Article		Environ. Pollut.	2018	10.1016/j.envpol.2018.07.084
299	J	Rani, Neelam; Kumari, Kusum; Sangwan, Parul; Barala, Poonam; Yadav, Jyoti; Vijeta; Rahul; Hooda, Vinita	Nano-iron and nano-zinc induced growth and metabolic changes in <i>Vigna radiata</i>	Article		Sustainability	2022	10.3390/su14148251
300	J	Rashid, Md Harunur; Rahman, Mohammad Mahmudur; Halim, Md Abdul; Naidu, Ravi	Growth, metal partitioning and antioxidant enzyme activities of mung beans as influenced by zinc oxide nanoparticles under cadmium stress	Article		Crop Pasture Sci.	2021	10.1071/CP21598
301	J	Peng, Danliu; Zhang, Yue; Li, Qian; Song, Yutong; Ji, Jing; Wang, Gang; Guan, Chunfeng; Li, Xiaozhou	Exogenous application and endogenous elevation of salicylic acid levels by overexpressing a salicylic acid-binding protein 2 gene enhance nZnO tolerance of tobacco plants	Article		Plant Soil	2020	10.1007/s11104-020-04521-4
302	J	Landa, Premysl; Cyrusova, Tereza; Jerabkova, Julie; Drabek, Ondrej; Vanek, Tomas; Podlipna, Radka	Effect of metal oxides on plant germination: Phytotoxicity of nanoparticles, bulk materials, and metal ions	Article		Water Air Soil Pollut.	2016	10.1007/s11270-016-3156-9
303	J	Zeid, Isam M. Abu; Mohamed, Fouad H.; Metwali, Ehab M. R.	Responses of two strawberry cultivars to NaCl-induced salt stress under the influence of ZnO nanoparticles	Article		Saudi J. Biol. Sci.	2023	10.1016/j.sjbs.2023.103623
304	J	Thapa, Mala; Sadhukhan, Raghunath; Mukherjee, Abhishek; Biswas, Prasanta Kumar	Effects of nZnS vs. nZnO and ZnCl <sub>2</sub> on mungbean [ <i>Vigna radiata</i> (L.) R. Wilczek] plant and <i>Bradyrhizobium symbiosis</i> : A life cycle study	Article		NanoImpact	2023	10.1016/j.impact.2022.100440
305	J	Yusefi-Tanha, Elham; Fallah, Sina; Rostamnejadi, Ali; Pokhrel, Lok Raj	Responses of soybean ( <i>Glycine max</i> [L.] Merr.) to zinc oxide nanoparticles: Understanding changes in root system architecture, zinc tissue partitioning and soil characteristics	Article		Sci. Total Environ.	2022	10.1016/j.scitotenv.2022.155348



306	J	Sharifan, Hamidreza; Moore, Janie; Ma, Xingmao	Zinc oxide (ZnO) nanoparticles elevated iron and copper contents and mitigated the bioavailability of lead and cadmium in different leafy greens	Article		Ecotox. Environ. Safe.	2020	10.1016/j.ecoenv.2020.110177
307	J	Bhattacharjee, Rahul; Kumar, Lamha; Mukerjee, Nobendu; Anand, Utpal; Dhasmana, Archana; Preetam, Subham; Bhaumik, Samudra; Sihi, Sanjana; Pal, Sanjana; Khare, Tushar; Chattopadhyay, Soham; El-Zahaby, Sally A.; Alexiou, Athanasios; Koshy, Eapen P.; Kumar, Vinay; Malik, Sumira; Dey, Abhijit; Prockow, Jaroslaw	The emergence of metal oxide nanoparticles (NPs) as a phytomedicine: A two-facet role in plant growth, nanotoxicity and anti-phyto-microbial activity	Review		Biomed. Pharmacother.	2022	10.1016/j.biopha.2022.113658
308	J	Liu, Ruiqiang; Zhang, Huiying; Lal, Rattan	Effects of stabilized nanoparticles of copper, zinc, manganese, and iron oxides in low concentrations on lettuce ( <i>Lactuca sativa</i> ) seed germination: Nanotoxicants or nanonutrients?	Article		Water Air Soil Pollut.	2016	10.1007/s11270-015-2738-2
309	J	Du, Wenchao; Xu, Meiling; Yin, Ying; Sun, Yuanyuan; Wu, Jichun; Zhu, Jianguo; Guo, Hongyan	Elevated CO <sub>2</sub> levels alleviated toxicity of ZnO nanoparticles to rice and soil bacteria	Article		Sci. Total Environ.	2022	10.1016/j.scitotenv.2021.149822
310	J	Samanta, Santanu; Roychoudhury, Aryadeep	Recent trend in nanoparticle research in regulating arsenic bioaccumulation and mitigating arsenic toxicity in plant species	Review		J. Plant Biochem. Biotechnol.	2021	10.1007/s13562-021-00727-4
311	J	Raza, Syed Hammad; Shahzadi, Anam; Iqbal, Muhammad; Shafiq, Fahad; Mahmood, Arslan; Anwar, Sumera; Ashraf, Muhammad	Foliar application of nano-zinc oxide crystals improved zinc biofortification in cauliflower ( <i>Brassica oleracea</i> L. var. botrytis)	Article		Appl. Nanosci.	2022	10.1007/s13204-022-02455-0
312	J	Mehmood, Faisal; Kousar, Hina; Hassan, Faiza; Zaman, Qamar Uz	Synthesis of zinc oxide nanoparticles by precipitation and sol-gel methods from different precursors and their comparison impact on seedling attributes of wheat	Article		J. Nano Res.	2022	10.4028/p-2sa57f
313	J	Ulhassan, Zaid; Bhat, Javaid Akhter; Zhou, Weijun;	Attenuation mechanisms of arsenic induced toxicity and its accumulation in	Review		Environ. Pollut.	2022	10.1016/j.envpol.2022.119038

		Senan, Ahmed M.; Alam, Pravej; Ahmad, Parvaiz	plants by engineered nanoparticles: A review					
314	J	Tanveer, Yashfa; Jahangir, Saman; Shah, Zafar Abbas; Yasmin, Humaira; Nosheen, Asia; Hassan, Muhammad Nadeem; Illyas, Noshin; Bajguz, Andrzej; El-Sheikh, Mohamed A.; Ahmad, Parvaiz	Zinc oxide nanoparticles mediated biostimulant impact on cadmium detoxification and in silico analysis of zinc oxide-cadmium networks in <i>Zea mays</i> L. regulome	Article		Environ. Pollut.	2023	10.1016/j.envpol.2022.120641
315	C	Starodub, Nickolaj F.; Shavanova, Kateryna E.; Taran, Marina V.; Katsev, Andrey M.; Safronyuk, Sergey L.; Son'ko, Roman V.; Bisio, Chiara; Guidotti, Matteo	Nanomaterials: Biological effects and some aspects of applications in ecology and agriculture	Proceedings Paper	8th International Conference on Advanced Optical Materials and Devices (AOMD)		2014	10.1117/12.2081468
316	J	Abrica-Gonzalez, Paulina; Gomez-Arroyo, Sandra	Effects and characterization of airborne nanoparticles (CuO, ZnO-NPs) in plants	Review		Rev. Int. Contam. Ambient.	2022	10.20937/RICA.54303
317	J	Afzal, Shadma; Singh, Nand K.	Effect of zinc and iron oxide nanoparticles on plant physiology, seed quality and microbial community structure in a rice-soil-microbial ecosystem	Article		Environ. Pollut.	2022	10.1016/j.envpol.2022.120224
318	J	Iranbakhsh, Alireza; Ardebili, Zahra Oraghi; Ardebili, Narges Oraghi; Ghoranneviss, Mahmood; Safari, Nasrin	Cold plasma relieved toxicity signs of nano zinc oxide in <i>Capsicum annuum</i> cayenne via modifying growth, differentiation, and physiology	Article		Acta Physiol. Plant.	2018	10.1007/s11738-018-2730-8
319	J	Nekoukhou, Marjan; Fallah, Sina; Abbasi-Surki, Ali; Pokhrel, Lok Raj; Rostamnejadi, Ali	Improved efficacy of foliar application of zinc oxide nanoparticles on zinc biofortification, primary productivity and secondary metabolite production in dragonhead	Article		J. Clean Prod.	2022	10.1016/j.jclepro.2022.134803
320	J	Yadav, Vaishali; Arif, Namira; Chauhan, Devendra Kumar	A comparative study of the effective response of di-potassium phosphate (K <sub>2</sub> HPO <sub>4</sub> ) on physiological, biochemical and anatomical aspects of crops dwelling with zinc oxide nanoparticles toxicity	Article		Toxicol. Res.	2021	10.1093/toxres/tfab004

321	J	Haulik, B.; Balla, S.; Palfi, O.; Szekeres, L.; Jurikova, T.; Saly, P.; Bakonyi, G.	Comparative ecotoxicity of the nano Ag, TiO <sub>2</sub> and ZnO to aquatic species assemblages	Article		Appl. Ecol. Environ. Res.	2015	
322	J	Dolores Fernandez, Maria; Nieves Alonso-Blazquez, Maria; Garcia-Gomez, Concepcion; Babin, Mar	Evaluation of zinc oxide nanoparticle toxicity in sludge products applied to agricultural soil using multispecies soil systems	Article		Sci. Total Environ.	2014	10.1016/j.scitotenv.2014.07.085
323	J	Yang, Xiangbo; Bai, Xia; Zhang, Zhenkai; Yu, Xiaoming	Metal oxide nanomaterials as rice transgenic carriers	Article		Adv. Mater. Sci. Eng.	2022	10.1155/2022/4375986
324	J	Bradfield, Scott J.; Kumar, Pawan; White, Jason C.; Ebbs, Stephen D.	Zinc, copper, or cerium accumulation from metal oxide nanoparticles or ions in sweet potato: Yield effects and projected dietary intake from consumption	Article		Plant Physiol. Biochem.	2017	10.1016/j.plaphy.2016.04.008
325	J	Cai, Yue; Yuan, Binbin; Ma, Xiaoyue; Fang, Guodong; Zhou, Dongmei; Gao, Juan	Foliar application of SiO <sub>2</sub> and ZnO nanoparticles affected polycyclic aromatic hydrocarbons uptake of Amaranth ( <i>Amaranthus tricolor</i> L.): A metabolomics and typical statistical analysis	Article		Sci. Total Environ.	2022	10.1016/j.scitotenv.2022.155258
326	J	Gupta, Nakul; Singh, Prabhakar Mohan; Sagar, Vidya; Pandya, Alok; Chinnappa, Manimurugan; Kumar, Rajesh; Bahadur, Anant	Seed priming with ZnO and Fe <sub>3</sub> O <sub>4</sub> nanoparticles alleviate the lead toxicity in <i>Basella alba</i> L. through reduced lead uptake and regulation of ROS	Article		Plants-Basel	2022	10.3390/plants11172227
327	J	Dimkpa, Christian O.; Singh, Upendra; Bindraban, Prem S.; Adisa, Ishaq O.; Elmer, Wade H.; Gardea-Torresdey, Jorge L.; White, Jason C.	Addition-omission of zinc, copper, and boron nano and bulk oxide particles demonstrate element and size-specific response of soybean to micronutrients exposure	Article		Sci. Total Environ.	2019	10.1016/j.scitotenv.2019.02.142
328	J	Venkatachalam, P.; Jayaraj, M.; Manikandan, R.; Geetha, N.; Rene, Eldon R.; Sharma, N. C.; Sahi, S. V.	Zinc oxide nanoparticles (ZnONPs) alleviate heavy metal-induced toxicity in <i>Leucaena leucocephala</i> seedlings: A physiochemical analysis	Article		Plant Physiol. Biochem.	2017	10.1016/j.plaphy.2016.08.022
329	J	Sharifan, Hamidreza; Ma, Xingmao; Moore, Janie McClurkin; Habib, Mohammad Ruzlan; Eyans, Catelyn	Zinc oxide nanoparticles alleviated the bioavailability of cadmium and lead and changed the uptake of iron in hydroponically grown lettuce ( <i>Lactuca sativa</i> L. var. Longifolia)	Article		ACS Sustain. Chem. Eng.	2019	10.1021/acssuschemeng.9b03531

330	J	Pedruzzi, Danielle P.; Araujo, Leandro O.; Falco, William F.; Machado, Giovanna; Casagrande, Gleison A.; Colbeck, Ian; Lawson, Tracy; Oliveira, Samuel L.; Caires, Anderson R. L.	ZnO nanoparticles impact on the photosynthetic activity of <i>Vicia faba</i> : Effect of particle size and concentration	Article		NanoImpact	2020	10.1016/j.impact.2020.100246
331	J	Yarmohammadi, Afsaneh; Khoramivafa, Mahmud; Honarmand, Saeid Jalali	Humic acid reduces the CuO and ZnO nanoparticles cellular toxicity in rapeseed ( <i>Brassica napus</i> )	Article		Cell. Mol. Biol.	2019	10.14715/cmb/2019.65.4.5
332	J	Babajani, Alameh; Iranbakhsh, Alireza; Ardebili, Zahra Oraghi; Eslami, Bahman	Differential growth, nutrition, physiology, and gene expression in <i>Melissa officinalis</i> mediated by zinc oxide and elemental selenium nanoparticles	Article		Environ. Sci. Pollut. Res.	2019	10.1007/s11356-019-05676-z
333	C	Pavelicova, Kristyna; Strejckova, Aneta; Rankic, Ivan; Vaneckova, Tereza; Zelnickova, Jaroslava; Huska, Dalibor; Vaculovicova, Marketa	Fluorescence in vivo imaging in the monitoring of effect of nanoparticles on microalgae	Proceedings Paper	25th International PhD Students Conference for Undergraduate and Postgraduate Students (MendelNet)		2018	
334	J	Yusefi-Tanha, Elham; Fallah, Sina; Pokhrel, Lok Raj; Rostamnejadi, Ali	Addressing global food insecurity: Soil-applied zinc oxide nanoparticles promote yield attributes and seed nutrient quality in <i>Glycine max</i> L.	Article		Sci. Total Environ.	2023	10.1016/j.scitotenv.2023.162762
335	J	Omar Ponce-Garcia, Castor; Manuel Soto-Parra, Juan; Sanchez, Esteban; Munoz-Marquez, Ezequiel; Javier Pina-Ramirez, Francisco; Antonia Flores-Cordova, Maria; Perez-Leal, Ramona; Yanez Munoz, Rosa Maria	Efficiency of nanoparticle, sulfate, and zinc-chelate use on biomass, yield, and nitrogen assimilation in green beans	Article		Agronomy-Basel	2019	10.3390/agronomy9030128
336	J	Ishwarya, Ramachandran; Tamilmani, Govindan; Jayakumar, Rengarajan; Albeshr, Mohammed F.;	Synthesis of zinc oxide nanoparticles using <i>Vigna mungo</i> seed husk extract: An enhanced antibacterial, anticancer activity and eco-friendly bio-toxicity	Article		J. Drug Deliv. Sci. Technol.	2023	10.1016/j.jddst.2022.104002

		Mahboob, Shahid; Shahid, Duaa; Riaz, Mian Nadeem; Govindarajan, Marimuthu; Vasecharan, Baskaralingam	assessment on algae and zooplankton					
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