

Chromium Publications Rejected as Not Acceptable for Plants and Invertebrates

Published literature that reported soil toxicity to terrestrial invertebrates and plants was identified, retrieved and screened. Published literature was deemed Acceptable if it met all 11 study acceptance criteria (Fig. 3.3 in section 3 “DERIVATION OF PLANT AND SOIL INVERTEBRATE ECO-SSLs” and ATTACHMENT J in Standard Operating Procedure #1: Plant and Soil Invertebrate Literature Search and Acquisition). Each study was further screened through nine specific study evaluation criteria (Table 3.2 Summary of Nine Study Evaluation Criteria for Plant and Soil Invertebrate Eco-SSLs, also in section 3 and ATTACHMENT A in Standard Operating Procedure #2: Plant and Soil Invertebrate Literature Evaluation and Data Extraction, Eco-SSL Derivation, Quality Assurance Review, and Technical Write-up.) Publications identified as Not Acceptable did not meet one or more of these criteria. All Not Acceptable publications have been assigned one or more keywords categorizing the reasons for rejection (Table 1. Literature Rejection Categories in Standard Operating Procedure #4: Wildlife TRV Literature Review, Data Extraction and Coding).

Rev	(NAS) National Academy of Sciences. 1974. Chromium: Medical and Biologic Effects of Environmental Pollutants. National Academy of Sciences, Washington, D.C. 125-145
Rev	(NRCC) National Research Council of Canada. 1976. Effects of Chromium in the Canadian Environment. NRCC No.15017, Associate Committee on Scientific Criteria for Environmental Quality, National Research Council of Canada, Ottawa , 168
OM, pH	Abbasi, S. A. and Soni, R. 1983. Stress-Induced Enhancement of Reproduction in Earthworm <i>Octochaetus pattoni</i> Exposed to Chromium (VI) and Mercury (II) - Implications in Environmental Management 39210. Int J Environ Stud 22, 43-47
No ERE	Achazi, R. K., Flenner, C., Livingstone, D. R., Peters, L. D., Schaub, K., and Scheiwe, E. 1998. Cytochrome P450 and Dependent Activities in Unexposed and PAH-Exposed Terrestrial Annelids. Comp.Biochem.Physiol. 121C[1-3], 339-350
Media	Aggangan, N. S., Dell, B., and Malajczuk, N. 1998. Effects of chromium and nickel on growth of the ectomycorrhizal fungus <i>Pisolithus</i> and formation of ectomycorrhizas on <i>Eucalyptus urophylla</i> S.T. Blake. Geoderma 84[1-3], 15-27
Rev	Akatsuka, K. and Fairhall, L. T. 1934. The Toxicology of Chromium. J Ind Hyg 16, 1-24
Mix	Alberici, T. M., Sopper, W. E., Storm, G. L., and Yahner, R. H. 1989. Trace Metals in Soil Vegetation and Voles from Mine Land Treated with Sewage Sludge. J Environ Qual 18, 115-120
Mix	Anderson, A. J., Meyer, D. R., and Mayer, F. K. 1973. Heavy Metal Toxicities: Levels of Nickel, Cobalt, and Chromium in the Soil and Plants Associated with Visual Symptoms and Variation in Growth of an Oat Crop. Aust.J.Agric.Res. 24, 557-571
No Dose	Arillo, A. and Melodia, F. 1991. Reduction Of Hexavalent Chromium By The Earthworm <i>Eisenia foetida</i> (Savigny). Ecotoxicol Environ Saf 21[1], 92-100
No Control	Athalye, V. V., Ramachandran, V., and D'souza, T. J. 1995. Influence of Chelating Agents on Plant Uptake of ⁵¹ Cr, ²¹⁰ Pb and ²¹⁰ Po. Environmental Pollution 89[1], 47-53

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FL	Austenfeld, F. A. 1979. Effects of Nickel, Cobalt and Chromium on Net Photosynthesis of Primary and Secondary Leaves of Phaseolus vulgaris L. (Nettophotosynthese der Primarund Folgeblätter von Phaseolus vulgaris L. unter dem Einfluss von Nickel, Kobalt und Chrom). Photosynthetica 13[4], 434-438
Media	Babich, H., Schiffenbauer, M., and Stotzky, G. 1982. Comparative Toxicity of Trivalent and Hexavalent Chromium to Fungi. Bull.Environ.Contam.Toxicol. 28[4], 452-459
No Control	Baig, M. M. H., Khan, M. S., Khan, N., Ferhat, S., Hossain, A., Osmani, M. J. A., and Lord, K. A. 1972. Gas Chromatographic and Radiometric Study of the Behavior of Carbon-14 DDT on Mustard Plants Under Tropical Conditions. Pak.J.Sci.Ind.Res. 15[3], 220-226
Media	Barcelo, J., Poschenrieder, C., and Gunse, B. 1985. Effect of Chromium VI on Mineral Element Composition of Bush Beans. J.Plant Nutr. 8[3], 211-217
Media	Barcelo, J., Poschenrieder, C., and Gunse, B. 1986. Water Relations in Chromium VI Treated Bush Bean Plants (Phaseolus vulgaris L. cv. Contender) Under Both Normal and Water Stress Conditions. J.Exp.Bot. 37[175], 178-187
No Dur	Bardgett, R. D., Speir, T. W., Ross, D. J., Yeates, G. W., and Kettles, H. A. 1994. Impact of pasture contamination by copper, chromium, and arsenic timber preservative on soil microbial properties and nematodes. Biol.Fertil.Soils 18[1], 71-79
No Dur	Bartosova, M., Pavel, J., and Koch, M. 1995. Relations between heavy metal levels in soil, detritophagous and phytophagous invertebrates. Toxicol.Environ.Chem. 52[1-4], 13-23
Media	Berry, W. L. 1978. Comparative Toxicity of VO ₃ , CrO ₂ -4, Ni ²⁺ , Cu ²⁺ , Zn ²⁺ , and Cd ²⁺ to Lettuce Seedlings. In: D.C.Adriano and I.L.Brisbin,Jr.(Eds.), Environmental Chemistry and Cycling Processes, Proc.Symp.Held at Augusta, Georgia, April 18-May 1, 1976, Tech.Info.Center, U.S.Dep of Energy (U.S.NTIS CONF-760429) , 582-589
No Control	Bhuiya, M. R. H. and Cornfield, A. H. 1976. Effect of Addition of Cu, Cr, Pb and Zn on Nitrogen Mineralisation and Nitrification No During Incubation of Sandy Soils. Bangladesh J.Biol.Sci. 5[1], 18-20
OM, pH	Biacs, P. A., Daood, H. G., and Kadar, I. 1995. Effect of Mo, Se, Zn and Cr Treatments on the Yield, Element Concentration, and Carotenoid Content of Carrot. Journal of Agricultural and Food Chemistry 43[3], 589-591

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Media	Bishnoi, N. R., Chugh, L. K., and Sawhney, S. K. 1993. Effect of Chromium on Photosynthesis, Respiration and Nitrogen Fixation in Pea (<i>Pisum sativum</i> L.) Seedlings. <i>J.Plant Physiol.</i> 142, 25-30
OM, pH	Bishnoi, N. R., Dua, A., Gupta, V. K., and Sawhney, S. K. 1993. Effect of Chromium on Seed Germination, Seedling Growth and Yield of Peas. <i>Agric.Ecosyst.EnvIRON.</i> 47[1], 47-57
Media	Bobak, M. 1974. Influence of Exogenous Added Cobalt upon the Submicroscopic Structure and the Chromosomes of Meristematic Cells of the Horse Bean (<i>Vicia faba</i> L.,C.V. Zborovicky). <i>Physiol.Plant.</i> 8, 17-24
No Dur	Breeze, V. G. 1973. Land Reclamation and River Pollution Problems in the Croal Valley Caused by Waste from Chromate Manufacture. <i>J Appl Ecol</i> 10[4], 513-525
FL	Cao, Renlin, He, Zonglan, and Huo, Wenrui. 1988. Effects of chromium(VI) added to soil on plant growth and its accumulation. <i>Zhongguo Huanjing Kexue</i> 8[3], 27-34
FL	Cao, Renlin, He, Zonglan, and Huo, Wenrui. 1988. Effects of chemical fertilizers produced with chromium residues on growth of crops. <i>Huanjing Kexue</i> 9[3], 44-48
Media	Cary, E. E., Allaway, W. H., and Olson, O. E. 1977. Control of Chromium Concentrations in Food Plants. 1. Absorption and Translocation of Chromium in Plants 40337. <i>J.Agric.Food Chem.</i> 25, 300-304
OM	Cary, E. E., Allaway, W. H., and Olson, O. E. 1977. Control of Chromium Concentrations in Food Plants. II. Chemistry of Chromium in Soils and Its Availability to Plants 40338. <i>J.Agric.Food Chem.</i> 25[2], 305-309
OM	Cary, E. E., Allaway, W. H., and Olson, O. E. 1977. Control of Chromium Concentrations in Food Plants. 2. Chemistry of Chromium in Soils and Its Availability to Plants 40340. <i>J.Agric.Food Chem.</i> 25[305-309]
OM	Cary, E. E., Allaway, W. H., and Olson, O. E. 1977. Control of Chromium Concentrations in Food Plants. I. Absorption and Translocation of Chromium by Plants 40339. <i>J.Agric.Food Chem.</i> 25[2], 300-304
Rev	Cary, E. E. 1982. Chromium in Air, Soil and Natural Waters. In: S.Langard (Ed.), <i>Biological and Environmental Aspects of Chromium</i> , Chapter 3, Elsevier, Amsterdam , 49-

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No Dur	Cary, Earle E. and Kubota, Joe. 1990. Chromium concentration plants: effects of soil chromium concentration and tissue contamination by soil. <i>J.Agric.Food Chem.</i> 38[1], 108-114
No Dose	Cataldo, D. A. and Wildung, R. E. 1978. Soil and Plant Factors Influencing the Accumulation of Heavy Metals by Plants. <i>Environ.Health Perspect.</i> 27, 149-159
FL	Celardin, F. and Landry, J. C. 1988. Bioindicators of pollution earthworms and heavy metals in soil. <i>ARCH SCI (GENEVA).Archives des Sciences (Geneva).</i> 41 (2).1988.225-228. 41[2], 225-228
Rev	Chang, A. C., Granato, T. C., and Page, A. L. 1992. A Methodology for Establishing Phytotoxicity Criteria for Chromium, Copper, Nickel, and Zinc in Agricultural Land Application of Municipal Sewage Sludges. <i>J Environ Qual</i> 21[4], 521-536
No Dose	Chatterjee, J. and Chatterjee, C. 2000. Phytotoxicity of Cobalt, Chromium and Copper in Cauliflower. <i>Environ.Pollut.</i> 109[1], 69-74
No Toxicity	Chebotar, A. A., Kaptar, S. G., Suruzhiu, A. I., and Bukhar, B. I. 1975. Chromosomal and nucleoplasmic changes in maize and wheat induced by bhc naphthalene and phenol. <i>Dokl.Biol.Sci.</i> 223[1-6], 320-321
FL	Chebotar, A. A., Kaptar, S. G., Suruzhiu, A. I., and Bukhar, B. I. 1975. Chromosomal and nucleoplasmic changes in corn and wheat under the effect of hexachloran naphthalene and phenol. <i>Dokl Akad Nauk Sssr Ser Biol.</i> 223[1], 213-215
No Dur	Chettri, M. K., Sawidis, T., and Karataglis, S. 1997. Lichens As A Tool For Biogeochemical Prospecting. <i>Ecotoxicol-Environ-Saf</i> 38[3], 322-335
Media	Clark, R. B., Pier, P. A., Knudsen, D., and Maranville, J. W. 1981. Effect of Trace Element Deficiencies and Excesses on Mineral Nutrients in Sorghum. <i>J.Plant Nutr.</i> 3[1-4], 357-374
Species	Corradi, M. G., Bianchi, A., and Albasini, A. 1993. Chromium Toxicity in <i>Salvia sclarea</i> -I. Effects of Hexavalent Chromium on Seed Germination and Seedling Development. <i>Environ.Exp.Bot.</i> 33[3], 405-413

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| Mix | Cunningham, J. D., Ryan, J. A., and Keeney, D. R. 1975. Phytotoxicity in and Metal Uptake from Soil Treated with Metal-Amended Sewage Sludge. <i>J Environ Qual</i> 4[4], 455-459 |
| Mix | Cunningham, J. D., Keeney, D. R., and Ryan, J. A. 1975. Phytotoxicity and Uptake of Metals Added to Soils as Inorganic Salts or in Sewage Sludge. <i>J Environ Qual</i> 4[4], 460-462 |
| Mix | Da Costa, E. W. B. and Bezemer, L. D. 1973. Anti-Fungal Effectiveness of Copper-Chrome-Arsenic Preservatives in a Phosphatic Environment. <i>Int.Biodeterior.Bull.</i> 9[1/2], 44-48 |
| Mix | Davis, R. D., Beckett, P. H. T., and Wollan, E. 1978. Critical Levels of Twenty Potentially Toxic Elements in Young Spring Barley. <i>Plant Soil</i> 49, 395-408 |
| Media | Degreave, N. 1971. Modification des Effects du Methane Sulfonated d'Ethyl au Niveau Chromosomique. I. Les Ions Metalligues. <i>Rev Cytol Biol Veg</i> 34, 233-244 |
| Media | Dekock, P. C. 1956. Heavy Metal Toxicity and Iron Chlorosis. <i>Ann.Bot.</i> 20[77], 133-141 |
| FL | Deng, Hua. 1987. Studies on the environmental differentiation of chromium in soils. <i>Turang (Nanjing) (CHI)</i> 19[1], 22-26 |
| Mix | Deshmukh, S. N. and Dutta, S. C. 1973. Study of the residues of ddt and endrin in or on maize by gas liquid chromatography. <i>Indian J Agric Sci</i> 43[1], 94-96 |
| Mix | Dowdy, R. H. and Ham, G. E. 1977. Soybean Growth and Elemental Content as Influenced by Soil Amendments of Sewage Sludge and Heavy Metals: Seedling Studies. <i>Agron.J.</i> 69, 300-303 |
| Media | Fargasova, A. 1994. Effect of Pb, Cd, Hg, As, and Cr on Germination and Root Growth of <i>Sinapis alba</i> Seeds. <i>Bull Environ Contam Toxicol</i> 52, 452-456 |
| Mix | Fargo, L. L. and Fleming, R. W. 1977. Effects of Chromate and Cadmium on Most Probable Number Estimates of Nitrifying Bacteria in Activated Sludge. <i>Bull Environ Contam Toxicol</i> 18[3], 350-354 |
| Media | Forge, T. A., Berrow, M. L., Darbyshire, J. F., and Warren, A. 1993. Protozoan bioassays of |

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soil amended with sewage sludge and heavy metals, using the common soil ciliate *Colpoda steinii*. *Biol.Fertil.Soils* 16, 282-286

- Media** Gorsuch, J. W., Kringle, R. O., and Robillard, K. A. 1990. Chemical Effects on the Germination and Early Growth of Terrestrial Plants. In: W.Wang, J.W.Gorsuch., and W.R.Lower (Eds.), *Plants for Toxicity Assessment*, ASTM STP 1091, Philadelphia, PA , 49-58
- Mix** Gray, N. F. 1988. Ecology of nematophagous fungi: effect of the soil nutrients nitrogen, phosphorus, and potassium and seven major metals on distribution. *Plant Soil* 108[2], 286-290
- FL** Grigor'eva, T. I., Pertsovskaya, A. F., Tonkopii, N. I., Perelygin, V. M., Beibetkhan, D., Velikanov, N. L., Shestopalova, G. E., and Bobrova, O. E. 1989. Hygienic Evaluation of Soil Pollution by Chromium. *Byull.Pochv.Inst.im.V.V.Dokuchaeva* 49, 19-23
- Mix** Grubinger, Vernon P., Gutenmann, Walter H., Doss, G. James, Rutzke, Michael, and List, Donald J. 1994. Chromium in swiss chard grown on soil amended with tannery meal fertilizer. *Chemosphere* 28[4], 717-720
- Media** Gstoettner, E. M. and Fisher, N. S. 1997. Accumulation of Cadmium, Chromium, and Zinc by the Moss *Sphagnum papillosum* Lindle. *Water Air Soil Pollut* 93, 321-330
- Mix** Gunse, B., Poschenrieder, C., and Barcelo, J. 1990. Correlation between extractable chromium, chromium uptake and productivity of beans (*Phaseolus vulgaris*) grown on tannery sludge-amended soil. *Dev.Plant Soil Sci., V41, NPlant Nutr.: Physiol.Appl.*, P307-12 41, 307-312
- FL** Gunse, B., Ponschenrieder, C., and Barcelo, J. 1992. Chromium and Agricultural Use of Tannery Sludges (II Cromo e L'Impiego in Agricoltura di Fanghi in Conceria). *Cuoio Pelli Mater.Concianti* 68[1], 57-65 (SPA) (ENG ABS)
- FL** Gusenleitner, J. and Nimmervoll, W. 1988. The Effect of Chromium Accumulation on Crop Growth in a Pot Trial with Two Different Soils of Upper Austria. *Bodenkultur.* 39[3], 217-231
- Species** Hadwiger, L., Bromersen, S., and Eddy, R. 1973. Increased Template Activity in Chromatin from Cadmium Chloride Treated Pea Tissues. *Biochem.Biophys Res.Commun.* 54[3],

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- Dup** Hadwiger, L. A., Von Broembsen, S., and Eddy, R., Jr. 1973. Increased Template Activity in Chromatin from Cadmium Chloride Treated Pea Tissues. *Biochem.Biophys.Res.Comm.* 50[4], 1120-1128
- No COC** Halder, C. A., Taber, R. A., and Camp, B. J. 1979. High performance liquid chromatography of the myco toxin sporidesmin from pithomyces-chartarum. *J Chromatogr* 175[2], 356-361
- No ERE** Hall, R. B. T. 1988. The Effect of Chromium Loading on Earthworms in an Amended Soil. Ph.D.Thesis Submitted to Dep.of Soil Science, University of Alberta, Edmonton, Alberta , 87
- FL** Hankawa, Y. 1971. Residues of organochlorine in crops and soil by electron-capture gas chromatography. I. Residues of aldrin and dieldrin in each organ of potato plant at several growing stages in spring cultivation. *Chugoku Nogyo Kenkyu* 43, 49-50
- Media** Hara, T. and Sonoda, Y. 1979. Comparison of the Toxicity of Heavy Metals to Cabbage Growth. *Plant Soil* 51, 127-133
- Media** Harvey, Scott D., Fellows, Robert J., Cataldo, Dominic A., and Bean, Roger M. 1990. Analysis of 2,4,6-trinitrotoluene and its transformation products in soils and plant tissues by high-performance liquid chromatography. *Journal of Chromatography* 518[2], 361-374
- Media** Hasnain, S. and Sabri, A. N. 1997. Growth Stimulation of Triticum aestivum Seedlings Under Cr-Stresses by Non-Rhizospheric Pseudomonad Strains. *Environ Pollut* 97[3], 265-273
- Media** Hauschild, M. Z. 1993. Chromium Content of Leaves Reveals Chromium(III)-Stress of Higher Plants Before Sensitive Biomarkers do. *Sci.Total Environ. Suppl.*, Part 2, 1345-1352
- Media** Hauschild, M. Z. 1994. Accumulation of Putrescine in Chromium-Exposed Barley and Rape: A Potential Biomarker in Higher Plant Tests. In: M.H.Donker, H.Eijsackers, and F.Heimbach (Eds.), *Ecotoxicology of Soil Organisms*, Chapter 13, SETAC Spec.Publ.Ser., Lewis Publ., Boca Raton, FL , 199-204
- Rev** Hossner, L. R., Loeppert, R. H., Newton, R. J., and Szaniszló, P. J. 1998. Literature

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	Review: Phytoaccumulation of Chromium, Uranium, and Plutonium in Plant Systems. Amarillo National Resource Center for Plutonium, TX (NTIS#DE98005257) , 51
Media	Huffman, E. W. D. and Allaway, W. H. 1973. Growth of Plants in Soluation Culture Containing Low Levels of Chromium. Plant Physiol 52, 72-75
Media	Huffman, E. W. D. and Allaway, W. H. 1973. Chromium in Plants: Distribution in Tissues, Organelles, and Extracts, Availability of Bean Leaf Cr to Animals. J.Agric.Food Chem. 21[6], 982-986
FL	Ishihara, M., Hase, Y., Yolomizo II, Konno, S., and Sato, K. 1968. Nutritional Disease of Satsuma mandarin Trees in Serpentine Soil. II. Influence of Excessive Nickel or Cadmium Applications on the Growth and Fruiting of Sarsuma mandarin Trees. Engei Shikenjo Hokoku Ser.A 7, 39-54
OM	Jackson, B. P., Miller, W. P., Schumann, A. W., and Sumner, M. E. 1999. Trace Element Solubility from Land Application of Fly Ash/Organic Waste Mixtures. J Environ Qual 28[2], 639-647
No Species	Jallah, J. K. and Smyth, T. J. 1998. Assessment of Rhizotoxic Aluminum in Soil Solutions by Computer and Chromogenic Speciation. Commun.Soil Sci.Plant Anal. 29[1/2], 37-50
Media	Jaworska, M., Gorczyca, A., Sepiol, J., and Tomasik, P. 1997. Effect of Metal Ions on the Entomopathogenic Nematode Heterohabditis becteriophora poinar (Nematode: Heterohabditidae) Under Laboratory Conditions. Water Air Soil Pollut 93, 157-166
OM, pH	Kajal, N., Dhingra, H. R., and Varghese, T. M. 1996. Flowering and Pollen Germination of Pea (Pisum sativum l.) Genotypes Raised in Chromium Polluted Soil. Indian J.Plant Physiol. 1[4], 290-292
No Dur	Khasim, D. Imam, Kumar, N. V. N., and Hussain, R. C. 1989. Environmental contamination of chromium in agricultural and animal products near a chromate industry. Bull.Environ.Contam.Toxicol. 43[5], 742-746
Media	Koppen, G. and Verschaeve, L. 1996. The Alkaline Comet Tst on Plant Cells: A New Genotoxicity Test for DNA Strand Breaks in Vicia faba Root Cells. Mutat Res 360, 193-200

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Media	Krupa, Z., Ruszkowski, M., and Gilowska-Jung, E. 1982. The Effect of Chromate of the Synthesis of Plastid Pigments and Lipoquinones in <i>Zea mays</i> L. Seedlings. <i>Acta Soc.Bot.Pol.</i> 51[2], 275-281
Media	Lahouti, M. and Peterson, P. J. 1979. Chromium Accumulation and Distribution in Crop Plants 13073. <i>J Sci Food Agric</i> 30, 136-142
Media	Lee, C. R., Sturgis, T. C., and Landin, M. C. 1976. A Hydroponic Study of Heavy Metal Uptake by Selected Marsh Plant Species. U.S.Army Eng Waterways Exp Stn Tech Rep.No.D-76-5 , 63
Media	Lee, E. H. and Foy, C. D. 1986. Aluminum Tolerance of Two Snap Bean Cultivars Related to Organic Acid Content Evaluated by High-Performance Liquid Chromatography. <i>J.Plant Nutr.</i> 9[12], 1481-1498
Meth	Lee, M. L., Vassilaros, D. L., White, C. M., and Novotny, M. 1979. Retention Indices for Programmed-Temperature Capillary-Column Gas Chromatography of Polycyclic Aromatic Hydrocarbons. <i>Anal.Chem.</i> 51[6], 768-774
Media	Levi, E., Dalschaert, X., and Wilmer, J. B. M. 1973. Retention and Absorption of Foliar Applied Cr. <i>Plant Soil</i> 38, 683-686
Media	Lui, Donghua, Jiang, Wusheng, Wang, Wei, and Zhai, Lin. 1995. Evaluation of metal ion toxicity on root tip cells by the allium test. <i>Israel Journal of Plant Sciences</i> 43, 125-133
Media	Lyon, G. L., Peterson, P. J., and Brooks, R. R. 1969. Chromium - 51 Distribution in Tissues and Extracts of <i>Leptospermum scoparium</i> . <i>Planta</i> 88, 282-287
Media	Lyon, G. L., Peterson, P. J., and Brooks, R. R. 1969. Chromium-51 transport in the xylem sap of <i>Leptospermum scoparium</i> (Manuka). <i>N Z J Sci</i> 12, 541-545
Media	Lyon, G. L., Peterson, P. J., and Brooks, R. R. 1969. <i>Planta</i> 88, 282-287
Media	Ma, T. H. 1981. <i>Tradescantia-paludosa</i> Micronucleus Bioassay and Pollen Tube Chromatid Aberration Test for In Situ Monitoring and Mutagen Screening. <i>Environ.Health Perspect.</i> 37, 85-90
OM, pH	McFarland, M. L., Ueckert, D. N., Hons, F. M., and Hartmann, S. 1992. Selective-

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	placement burial of drilling fluids ii. Effects on buffalograss and fourwing saltbush. J Environ Qual 21[1], 140-144
No Dose	McGrath, S. P. 1982. The Uptake and Translocation of tri- and hexa-Valent Chromium and Effects on the Growth of Oat in Flowing Nutrient Solution. New Phytol 92, 381-390
OM, pH	Mikula, W. and Indeka, L. 1997. Heavy metals in allotment gardens close to an oil refinery in plock. Water Air Soil Pollut. 96[1/4], 61-71
OM	Mishra, S., Singh, V., Srivastava, S., Srivastava, R., Srivastava, M. M., Dass, S., Satsangi, G. P., and Prakash, S. 1995. Studies on Uptake of Trivalent and Hexavalent Chromium by Maize (<i>Zea Mays</i>). Food Chem Toxicol 33[5], 393-397
OM	Mishra, S., Shanker, K., Srivastava, M. M., Srivastava, S., Shrivastav, R., Dass, S., and Prakash, S. 1997. A Study on the Uptake of Trivalent and Hexavalent Chromium by Paddy (<i>Oryza sativa</i>): Possible Chemical Modifications in Rhizosphere. Agric.Ecosyst.Environ. 62[1], 53-58
FL	Misra, S. G. and Misra, Uma Shanker. 1996. Effect of adding soluble form of heavy metals on the numbers of earthworms at different depths. Vijnana Parishad Anusandhan Patrika 39[2], 79-83
Media	Molnar, L., Fischer, E., and Kallay, M. 1989. Laboratory Studies on the Effect, Uptake and Distribution of Chromium in <i>Eisenia foetida</i> (Annelida, Oligochaeta). Zool Anz 223[1/2], 57-66
Media	Moral, R., Palacios, G., Gomez, I., Navarro-Pedreno, J., and Mataix, J. 1994. Distribution and Accumulation of Heavy Metals (Cd, Ni and Cr) in Tomato Plant. Fresenius Environ.Bull. 3, 395-399
Media	Moral, R., Pedreno, J. N., Gomez, I., and Mataix, J. 1995. Effects of Chromium on the Nutrient Element Content and Morphology of Tomato. J.Plant Nutr. 18[4], 815-822
Media	Mukherje., A. and Sharma, A. 1988. Effects of Cadmium and Selenium on Cell-Division and Chromosomal-Aberrations in <i>Allium-sativum</i> L. Water Air Soil Pollut 37[3/4], 433-438
Media	Mukherji, S. and Roy, B. K. 1977. Toxic Effects of Chromium on Germinating Seedlings and Potato Tuber Slices. Biochem.Physiol.Pflanz. 171, 235-238

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Media	Mukherji, S. and Roy, B. K. 1978. Characterization of Chromium Toxicity in Different Plant Materials. Indian J.Exp.Biol. 16[9], 1017-1019
Media	Myttenaere, C. and Mousny, J. M. 1974. The Distribution of Chromium-51 in Lowland Rice in Relation to the Chemical Form and to the Amount of Stable Chromium in the Nutrient Solution. Plant Soil 41, 65-72
FL	Nakani, D. V. and Korsak, M. N. 1976. Effects of Chromium, Cadmium, and Zinc on the Rate of Photosynthesis in Short-Term Experiments. Biol.Nauki (Moscow) 19, 84-86
FL	Nemeth, Miklos and Meszaros, Maria. 1988. The effect of chromium-containing petroleum drilling muds on cultivated plants. Bot.Kozl. 74-75[3-4], 427-440
pH	Nyarai-Horvath, F., Szalai, T., Kadar, I., and Csatho, P. 1997. Germination characteristics of pea seeds originating from a field trial treated with different levels of harmful elements. Acta Agron.Hung. 452[147-154]
Media	Okamoto, K., Suzuki, M., Fukanim, M., Toda, S., and Fuwa, K. 1977. Heavy Metal Tolerance of Penicillium Ochro-Chloron II. Uptake of Heavy Metals by Copper Tolerant Fungus Penicillium Ochro-Chloron. Agric.Biol.Chem. 41, 17-22
Rev	Outridge, P. M. and Scheuhammer, A. M. 1993. Bioaccumulation and Toxicology of Chromium: Implications for Wildlife. Rev Contam Toxicol 130, 31-77
Species	Palmer, C. D. and Puls, R. W. 1995. Natural Attenuation Of Hexavalent Chromium In Ground Water And Soils. Ground Water Issue. Govt-Reports-Announcements-&-Index-(GRA&I) [11]
No Dose	Parr, P. D. and Taylor, F. G. Jr. 1980. Incorporation of Chromium in Vegetation Through Root Uptake and Foliar Absorption Pathways. Environ.Exp.Bot. 20, 157-160
Media	Patel, P. M., Wallace, A., and Mueller, R. T. 1976. Some Effects of Copper, Cobalt, Cadmium, Zinc, Nickel, and Chromium on Growth and Mineral Element Concentration in Chrysanthemum. J.Am.Soc.Hortic.Sci. 101[5], 553-556
FL	Pavlov, V. N. and Agre, S. 1978. Determination of Chromium in the soil, Plants and in Biomaterials. Gigien.Aspekty Okhrany Okrugh.Sredy, (Moskva) [6], 232-233

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FL	Pfeiffer, T., Simmermacher, W., and Rippel, A. 1918. The Action of Chromium and Manganese on Plant Growth. <i>Fuhling's Landw.Ztg.</i> 67, 313-323
Mix	Piha, M. I., Vallack, H. W., Reeler, B. M., and Michael, N. 1995. A low input approach to vegetation establishment on mine and coal ash wastes in semi-arid regions. I. Tin mine tailings in Zimbabwe. <i>Journal of Applied Ecology</i> , 372-381
Media	Popham, J. D. and Webster, J. M. 1976. Comparative toxicity of heavy metals with special reference to cadmium on caenorhabditis-elegans. <i>Proc Int Colloq Invertebr Pathol</i> , 372-373
Media	Prakasham, R. S., Merrie, J. S., Sheela, R., Saswathi, N., and Ramakrishna, S. V. 1999. Biosorption of Chromium VI by Free and Immobilized <i>Rhizopus arrhizus</i> . <i>Environ Pollut</i> 104[3], 421-427
Rev	Pratt, P. F. 1966. Chromium. In: H.D.Chapman (Ed.), <i>Diagnostic Criteria for Plants and Soils</i> , University of California, Berkeley, CA , 136, 140-136, 141
No ERE	Premi, P. R. and Cornfield, A. H. 1969. Effects of Addition of Copper, Manganese, Zinc and Chromium Compounds on Ammonification and Nitrification No During Incubation of Soil. <i>Plant Soil</i> 31[2], 345-352
Species	Premi, P. R. and Cornfield, A. H. 1970. Effects of Copper, Zinc and Chromium on Immobilization and Subsequent Re-Mobilization of Nitrogen No During Incubation of Soil Treated with Sucrose. <i>Geoderma</i> 3, 233-237
Media	Ramachandran, V., D'souza, T. J., and Mistry, K. B. 1980. Uptake and Transport of Chromium in Plants. <i>J.Nucl.Agric.Biol.</i> 9, 126-128
FL	Rauta, C., Ionescu, A., Petre, N., Mihalache, G., Dancau, H., Neata, G., Vago, D., and Mocanu, A. 1989. Effect of Pollution by Chromium on the Biological Activity of the Soil (Cercetari Preliminare Privind Influenta Poluarii Cu crom Asupra Activitatii Biologice din Sol). <i>An.Inst.Cercet.Pedol.Agrochim.</i> 50, 243-254
FL	Rauta, C., Ionescu, Ariana, Neata, Gabriela, Carstea, S., Mihailescu, A., and Mocanu, Adina. 1990. Effects on crop plants of soil pollution by chromium. <i>An.Inst.Cercet.Pedol.Agrochim., Acad.Stiinte Agric.Silvice</i> 50, 235-242
Media	Rout, G. R., Samantaray, S., and Das, P. 1997. Differential chromium tolerance among

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eight mung bean cultivars grown in nutrient culture. J.Plant Nutr. 20[4/5], 473-483

Mix	Rout, G. R., Samantaray, S., and Das, P. 2000. Effects of Chromium and Nickel on Germination and Growth in Tolerant and Non-Tolerant Populations of <i>Echinochloa colona</i> (L.) Link. <i>Chemosphere</i> 40[8], 855-859
No Data	Salunkhe, P. B., Dhakephalkar, P. K., and Paknikar, K. M. 1998. Bioremediation of hexavalent chromium in soil microcosms. <i>Biotechnol.Lett.</i> 20[8], 749-751
Rev	Samantaray, S., Rout, G. R., and Das, P. 1998. Role of Chromium on Plant Growth and Metabolism 14325. <i>Acta Physiol.Plant.</i> 20[2], 201-212
pH	Sarkunan, V., Misra, A. K., and Nayar, P. K. 1989. Chromium(VI) toxicity in rice grown under flooded condition in an alluvial soil. <i>J.Indian Soc.Soil Sci.</i> 37[3], 513-517
No Dur	Schuhmacher, M., Domingo, J. L., Llobet, J. M., and Corbella, J. 1993. Chromium, copper, and zinc concentrations in edible vegetables grown in tarragona province, spain. <i>Bulletin of Environmental Contamination and Toxicology</i> 50[4], 514-521
No Dur	Schuhmacher, M., Domingo, J. L., Llobet, J. M., and Corbella, J. 1994. Cadmium, chromium, copper, and zinc in rice and rice field soil from southern Catalonia, Spain. <i>Bulletin of Environmental Contamination and Toxicology</i> 53[1], 54-60
OM, pH	Sharma, D. C. and Sharma, C. P. 1993. Chromium uptake and its effects on growth and biological yield of wheat. <i>Cereal Res.Commun.</i> 21[4], 317-322
OM, pH	Sharma, D. C. and Pant, R. C. 1994. Chromium Uptake and Its Effects on Certain Plant Nutrients in Maize (<i>Zea mays</i> l. Cv. Ganga 5). <i>J. Environ.Sci.Health A29</i> [5], 941-948
Mix	Sheppard, M. I., Sheppard, S. C., and Thibault, D. H. 1984. Uptake by Plants and Migration of Uranium and Chromium in field Lysimeters. <i>J Environ Qual</i> 13[3], 357-361
Media	Shewry, P. R. and Peterson, P. J. 1974. The Uptake and Tranport of Chromium by Barley Seedlings (<i>Hordeum vulgare</i> L.). <i>J.Exp.Bot.</i> 25, 785-797
Mix	Shivas, S. A. J. 1980. The effects of trivalent chromium from tannery wastes on earthworms. <i>The Journal Of The American Leather Chemists Association.</i> 75[8], 300-304

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Mix	Shivas, Stephen A. J. 1984. The effects of trivalent chromium from tannery wastes on earthworms, Part II. J.Am.Leather Chem.Assoc. 79[5], 207-214
In Vit	Siegel, S. M. 1977. The Cytotoxic Response of Nicotiana Protoplast to Metal Ions: A Survey of the Chemical Elements. Water Air Soil Pollut 8[1-4], 293-304
OM, pH	Singh, B. R. and Steinnes, E. 1976. Uptake of Trace Elements by Barley in Zinc-Polluted Soils: 2. Lead, Cadmium, Mercury, Selenium, Arsenic, Chromium, and Vanadium in Barley. Soil Sci. 121[1], 38-43
Media	Skeffington, R. A., Shewry, P. R., and Peterson, P. J. 1976. Chromium Uptake and Transport in Barley Seedlings (Hordeum vulgare L.). Planta (Berl.) 132, 209-214
Rev	Slooff, W., Cleven, R. F. M. J., Janus, J. A., and Van der Poel, P. 1990. Integrated Criteria Document Chromium. RIVM Rep.No.710401 002, The Netherlands , 152
Species	Smith, C. J., Hopmans, P., and Cook, F. J. 1996. Accumulation of Cr, Pb, Cu, Ni, Zn and Cd in soil following irrigation with treated urban effluent in Australia. Environmental Pollution 94[3], 317-323
Rev	Smith, S., Peterson, P. J., and Harwood, J. L. 1989. Chromium Accumulation, Transport and Toxicity in Plants. Toxicol Environ Chem 24, 241-251
Media	Soane, B. D. and Saunder, D. H. 1959. Nickel and Chromium Toxicity of Serpentine Soils in Southern Rhodesia. Soil Sci. 8, 322-330
OM, pH	Soni, R. and Abbasi, S. A. 1981. Mortality and reproduction in earthworms pheretima-posthuma exposed to chromium vi 47456. Int J Environ Stud 17[2], 147-149
Media	Spasojevic, V. 1979. Chromosome Mutations Induced by Cadmium Chloride in Maize. Bull.Acad.Serbe Sci.Arts Cl.Sci.Nat.Math.Sci.Nat. 68[19], 57-63
Mix	Speir, T. W., Ross, D. J., Feltham, C. W., Orchard, V. A., and Yeates, G. W. 1992. Assessment of the feasibility of using CCA (copper, chromium and arsenic)-treated and boric acid-treated sawdust as soil amendments. II. Soil biochemical and biological properties. Plant Soil 142[2], 249-258

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No COC	Speir, T. W., August, J. A., and Feltham, C. W. 1992. Assessment of the feasibility of using cca copper chromium and arsenic-treated and boric acid-treated sawdust as soil amendments i. Plant growth and element uptake. <i>Plant Soil</i> 142[2], 235-248
Media	Srivastava, S., Srivastava, S., Prakash, S., and Srivastava, M. M. 1998. Fate of Trivalent Chromium in Presence of Organic Acids: A Hydroponic Study on the Tomato Plant. <i>Chem.Spec.Bioavail.</i> 10[4], 147-150
No ERE	Srivastava, S., Shanker, K., Srivastava, S., Shrivastav, R., Das, S., Prakash, S., and Srivastava, M. M. 1998. Effect of Selenium Supplementation on the Uptake and Translocation of Chromium by Spinach (<i>Spinacea oleracea</i>). <i>Bull Environ Contam Toxicol</i> 60[5], 750-758
No ERE	Srivastava, S., Shanker, K., Shrivastav, R., Das, S., Prakash, S., and Srivastava, M. M. 1998. Effect of Selenium Supplementation on the Uptake and Translocation of Chromium by Spinach (<i>Spinacea oleracea</i>) 47545. <i>Bulletin of Environmental Contamination & Toxicology</i> 60[5], 750-758
Media	Srivastava, S., Nigam, R., Prakash, S., and Srivastava, M. M. 1999. Mobilization of Trivalent Chromium in Presence of Organic Acids: A Hydroponic Study of Wheat Plant (<i>Triticum vulgare</i>). <i>Bull Environ Contam Toxicol</i> 63[4], 524-530
Media	Starich, G. H. and Blincoe, C. 1982. Properties of a Chromium Complex from Higher Plants. <i>J.Agric.Food Chem.</i> 30, 458-462
No Control	Starich, G. H. and Blincoe, C. 1983. Dietary Chromium - Forms and Availabilities. <i>Sci.Total Environ.</i> 28, 443-454
Media	Strati, S., Paoletti, E., Barbolani, E., and Pirazzi, R. 1999. Boot Length and Distribution of Chromium in <i>Corylus avellana</i> with <i>Tuber Albidum</i> mycorrhizas. <i>Water Air Soil Pollut</i> 113[1-4], 33-41
Species	Thorgeirsson, S. S., Atlas, S. A., Boobis, A. R., and Felton, J. S. 1979. Species Differences in the Substrate Specificity of Hepatic Cytochrome P-448 from Polycyclic Hydrocarbon-Treated Animals. <i>Biochem.Pharmacol.</i> 28, 217-226
Media	Tiefenbacher, K., Tuschl, P., and Woidich, H. 1983. An experiment on the uptake of polycyclic aromatic hydrocarbons by higher plants using chromatographic methods and

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isotope techniques. *Bodenkultur* 34[2], 147-160

- Mix** Tolle, Duane A., Arthur, Mickey F., Chesson, Jean, and Van Voris, Peter. 1985. Comparison of pots versus microcosms for predicting agroecosystem effects due to waste amendment. *Environ.Toxicol.Chem.* 4[4], 501-509
- OM, pH** Tripathi, A. K. and Tripathi, S. 1999. Changes in Some Physiological and Biochemical Characters in *Albizia lebbek* as Bio-Indicators of Heavy Metal Toxicity. *J Environ Biol* 20[2], 93-98
- Media** Tso, T. C., Sorokin, T. P., and Engelhaupt, M. E. 1973. Effects of Some Rare Elements on Nicotine Content of the Tobacco Plant. *Plant Physiol* 51, 805-806
- OM, pH** Turner, M. A. and Rust, R. H. 1971. Effect of Chromium on Growth and Mineral Nutrition of Soybeans. *Soil Sci Am Proc* 35[1], 755-758
- FL** Uccelli, Raffaella, Angelone, Massimo, Cima, Maria Grazia, Ferrandi, Luigi, Pompei, Franco, Stronati, Laura, and Triolo, Lucio. 1992. Air pollution on the territory of the Tarquinia Agricultural University. Concentrations of nickel, chromium, lead, and cadmium in soil and in some plant and animal species. *Inquinamento* 34[10], 64-74
- Mix** Vago, I., Gyori, Z., and Loch, J. 1996. Comparison of Chromium and Nickel Uptake of Plants Grown in Different Soils. *Fresenius' J.Anal.Chem.* 354[5/6], 714-717
- No Dur** Van der Merwe, A. J. and Anderssen, F. G. 1937. Chromium and Manganese Toxicity. Is it Important in Transvaal Citrus Growing? *Farming South Afr.* 12, 439-440
- Media** Vazquez, M. D., Poschenrieder, C., and Barcelo, J. 1987. Chromium VI Induced Structural and Ultrastructural Changes in Bush Bean Plants (*Phaseolus vulgaris* L.). *Ann.Bot.* 59, 427-438
- Media** Wallace, A., Alexander, G. V., and Chaudhry, F. M. 1977. Phytotoxicity of Cobalt Vanadium Titanium Silver and Chromium. *Comm.Soil Sci.Plant Anal.* 8[9], 751-756
- Media** Wallace, A., Alexander, G. V., and Chaudry, F. M. 1977. Phytotoxicity of Cobalt, Vanadium, Titanium, Silver, and Chromium. *Commun.Soil Sci.Plant Anal.* 8[9], 751-756
- No Control** Wallace, A., Romney, E. M., and Patel, P. M. 1978. Role of Synthetic Chelating Agents in

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Published literature that reported soil toxicity to terrestrial invertebrates and plants was identified, retrieved and screened. Published literature was deemed Acceptable if it met all 11 study acceptance criteria (Fig. 3.3 in section 3 “DERIVATION OF PLANT AND SOIL INVERTEBRATE ECO-SSLs” and ATTACHMENT J in Standard Operating Procedure #1: Plant and Soil Invertebrate Literature Search and Acquisition). Each study was further screened through nine specific study evaluation criteria (Table 3.2 Summary of Nine Study Evaluation Criteria for Plant and Soil Invertebrate Eco-SSLs, also in section 3 and ATTACHMENT A in Standard Operating Procedure #2: Plant and Soil Invertebrate Literature Evaluation and Data Extraction, Eco-SSL Derivation, Quality Assurance Review, and Technical Write-up.) Publications identified as Not Acceptable did not meet one or more of these criteria. All Not Acceptable publications have been assigned one or more keywords categorizing the reasons for rejection (Table 1. Literature Rejection Categories in Standard Operating Procedure #4: Wildlife TRV Literature Review, Data Extraction and Coding).

	Trace Metal Uptake by Plants. In: D.C.Adriano and I.L.Brisbin,Jr.(Eds.), Environmental Chemistry and Cycling Processes, Proc.Symp.Held at Augusta, Georgia, April 18-May 1, 1976, Tech.Info.Center, U.S.Dep of Energy (U.S.NTIS CONF-760429) , 645-657
Media	Wang, W. 1987. Root Elongation Method for Toxicity Testing of Organic and Inorganic Pollutants. Environ Toxicol Chem 6[5], 409-414
Media	Wang, W. 1993. Comparative Rice Seed Toxicity Tests using Filter Paper, Growth Pouch, and Seed Tray Methods. Environmental Monitoring and Assessment 24[3], 257-265
Media	Wang, W. 1994. Rice Seed Toxicity Tests for Organic and Inorganic Substances. Environ.Monit.Assess. 29, 101-107
FL	Wang, Y. P. and Chao, C. C. 1992. Effects of vesicular-arbuscular mycorrhizae and heavy metals on the growth of soybean and phosphate and heavy metal uptake by soybe AGRIC ASSOC CHINA NEW SER [157], 6-20
No Dur	Webber, J. 1972. Effects of Toxic Metals in Sewage on Crops. Water Pollut Control 71, 404-413
Media	Welch, R. M. and Cary, E. E. 1975. Concentration of Chromium, Nickel, and Vanadium in Plant Materials. J.Agric.Food Chem. 23, 479
Media	Wettlaufer, S. H., Osmeloski, J., and Weinstein, L. H. 1991. Response of polyamines to heavy metal stress in oat seedlings. Environ Toxicol Chem 10[8], 1083-1088
No Control	Whitten, M. G., Ritchie, G. S. P., and Willett, I. R. 1992. Forms of soluble aluminium in an in major soil groups of taiwan. J acidic topsoils estimated by ion chromatography and 8 hydroxyquinoline and their correlation with growth of subterranean clover. J Soil Sci 43[2], 283-293
Media	Wong, M. H. and Bradshaw, A. D. 1982. A Comparison of the Toxicity of Heavy Metals, Using Root Elongation of Rye Grass, Lolium perenne. New Phytol. 91, 255-261
FL	Xi, Yuying, Li, Feng, and Fan, Jiaren. 1989. Rule of accumulation and movement of chromium and arsenic in soil and the inside of plants. Shanxi Daxue Xuebao, Ziran Kexueban 12[4], 472-480

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Mix	Yeates, G. W., Orchard, V. A., and Speir, T. W. 1995. Reduction In Faunal Populations And Decomposition Following Pasture Contamination By A Cu-Cr-As Based Timber Preservative. <i>Acta Zool.Fenn.</i> [196], 297-300
Not Avail	Young, L. Y. 1994. Microbial Mediated Transformations Of Chromium And Cadmium In The Environment 10791. Crisp-Data-Base-National-Institutes-Of-Health 1994
Not Avail	Young, L. Y. 1995. Microbial Mediated Transformations Of Chromium And Cadmium In The Environment 10792. Crisp-Data-Base-National-Institutes-Of-Health 1995
FL	Yuan, T. L. 1955. The Accumulation and Distribution of Scandium, Chromium, Iodine, Cesium and Thallium in the Corn Plant (Continued). <i>J.Agric.Assoc.China (Taipei) (N.S.) /Chung-Hua Nung Hseueh Hui Pao</i> 9, 67-72
FL	Zhang, Chunlong, He, Zengyao, and Ye, Zhaojie. 1988. Effects of chromium on nodulation and nitrogenase activity of soybean (<i>Glycine max L.</i>). <i>Zhongguo Huanjing Kexue</i> 8[3], 41-44
FL	Zhou, Yiyong, Liu, Tongchou, and Deng, Boer. 1990. Toxicological effect of chromium on chlorophyll and iron contents and activities of some enzymes in the leaves of pepper (<i>Capsicum annum</i>). <i>Huanjing Kexue (CHI)</i> 11[3], 28-29