Subject Index

A Aquatic toxicology, 209, 383 AQUIRE data base, 79(table) 2-aminofluorene, 287 Arabidopsis, 365 Acetaminophen, 287 Asbestos, 326 Adducts, 297 Assay methods Aflatoxin B1 chlorophyll fluorescence, 146 Agricultural chemicals Assays for gene mutation, 326 effect on plant growth and metabolism, Atrazine effects on aquatic plants, 81(table), 267 Agricultural soil amendment, 12 Air pollution lichens, 276 toxic exposure to cadmium, 161 В Alachlor, 267 Algal bioassays Bacterial activity, 383 with monophenolic acids, 230 Barley, 297, 355 Benzene, 326 Benzenesulfonic acid, 355 growth medium, 218(table) periphytic, 126 Benzo(a)pyrene, 318 recommendations for test species, 77 Bioassays use in assessing toxicity, 41, 107, 126 algal, 230 Algae sensitivity to insecticides and aneuploidy-inducing agents, 326 herbicides, 84(table) cyanophage/host assay, 383 Analysis of covariance, 126 effects of toxic chemicals, 365 ANCOVA (See Analysis of covariance) phytotoxicity, 333, 355 Aneuploidy, 326 seed germination, 333 selenastrum capricornutum, 217 Animal carcinogens, 297 Animal drug wastes, 12 terrestrial plants, 197 Animals tradescantia micronucleus, 309 influence of halo-organic compounds, use of plants for toxicity assessment, 41, 258 126 Anthracene, 209 Bioconcentration, 178 Anthropogenic chemicals, 240 Bioindicator, 41, 101 Antimutagen, 287 Biomonitoring Aquatic macrophytes aquatic systems, 126 pesticide toxicity, 77 industrial effluents, 376 response to herbicides, 267 Bioremediation, 41 Biotechnology, 41 toxicity of chlorinated hydrocarbons, 178 Aquatic plants, 41, 267 Biotransformation, 250 Aquatic systems—toxidity, 126 Blocking, 60 Aquatic test systems, 267 Brassica, 365

C

2-chloroacetamide, 333 CO₂ (See Carbon dioxide) Cadmium toxicity biochemical effects, 161 hazard assessment, 240 health effects in ecosystem, 161 selenastrum, 107, 111-112(figs) toxic effects from air pollution, 161 Calculated effect, 217 Carbon dioxide toxic effects on marine phytoplankton, 118 Carcinogen, 297 Carson, Rachel (author) Silent Spring, 1962, 5 Chemical effects on plant behavior experimental design, 60 Chemical hazard to wetland plants, 341 Chemical influence of plants on xenobiotics, 250, 287 Chemical waste sites, 309 Chemicals, test physical properties, 357(table) Chinese spring wheat assay, 326 Clastogenicity, 326 Chlorella, 230 Chlorinated hydrocarbons toxicity in aquatic macrophytes and fish, Chlorobenzene lethality in fish and aquatic plants, Chlorobiphenyl(PCB), 178 Chlorophenol, 355 Chlorophyceae for freshwater algae tests, 77 Chlorophyll fluorescence, 146 Coincubation assay, 318 Complete amendment, 217 Compost assay, 383 Consumer protection U.S. Food and Drug Administration(FDA), 12 Contaminants plant uptake, 172 Copper, 101, 107 Crucifer, 365 Cultured plant cells, 287 Cyanobacteria, 383 Cyanophage/host assay, 383, 389–390(tables)

D

2,2-dichloropropionic acid, 365 Dalapon, 365, 371(tables) Design experiments effects of chemicals on plant behavior, 60 Dicamba, 355 Dichlobenil, 355 Dichloroanaline, 355 Dichlorobenzene, 355 Dichlorophenol, 355 2,2-Dichloropropionic acid, 365 Diethyldithiocarbamate, 287 Diethylstilbestrol, 326 Difluoro-chloro-bromo-methane, 258 Dinitrobenzene, 250, 355 Dinitrotoluene, 355 DNA, 297 Drug wastes animal, 12 Duckweed, 68

E

Early growth, 29 Early seedling growth test, (EPA, EG-13), 365 E_{50} , 29, 217 Echinochloa crusgalli, 341 Ecological assessment, 41, 197, 333, 365 Ecotoxicology (See also Toxicology) 29, 118, 197, 240, 341 Effluent toxicity, 68, 130–131(table) Electron microscopy, 276 Emission spectroscopy, 240 Environmental assessment chemical waste sites, 309 plant bioassays to predict effects of chemicals, 12, 309 plant-chemical tests, 6(table) use of plants for toxicity assessment, 41, 309 xenobiotics, 250 Environmental chemicals possible factor in human carcino-genesis, Environmental data profiles, 24–25(tables), 26(table) Environmental protection, 5, 355 Environmental toxicology, 41, 287, 309

European Community(EC), 29

Experimental design, 60

F	potential from manmade chemicals, 5 terrestrial plant bioassays with pesticides
Factorial design, 60	197, 199(table)
FDA (See Food and Drug Administration)	toluene, 240
Federal Food, Drug and Cosmetic Act	xenobiotics, 250
(FFDCA), 12	Hazard identification, 309
FFDCA (See Federal Food, Drug, and	Hazardous materials
Cosmetic Act)	chemical waste site, 309
Fish, 178	evaluation of phytoxicity, 333
Fluorescence bioassays, 41	influence of plant biomass, 250
Fluorometer, 14	Hazardous waste sites, 333
Food additives	Health effects, 161, 309
environmental assessment, 12, 23–24 and	Heavy metal rich industrial effluents, 376
26(tables)	Herbicides
factors for plant toxicity testing, 22(fig)	algae sensitivity, 84(table)
Food and Drug Administration (FDA), 12	cyanophage/host assay for toxicity, 383,
Food chain effects, 126, 140, 287, 318	387(table)
Freshwater algae species	impact on plant growth, 250
effect of test duration toxic response,	phytotoxicity on aquatic plants, 267
81(table)	plant toxicity, 355
used in pesticide toxicity tests, 80(table)	toxicity assay, 146, 152–157(tables, figs)
Fumigation experiments with spruce, 258	Humics, 230
	Hydrilla verticillata
G	sublethal stress, 101
	Hydrocarbons, 118
Genetic hazard at chemical waste sites, 309	Hydrophobicity, 178
Genetically engineered plants, 41	
Genotoxic metabolites, 318	_
Genotoxicity of chromium compounds,	Ĭ
326, 328(table)	
Germination, 29, 341, 379–380(tables)	ICPAES (See Inductively coupled atomic
Glasshouse bioassay, 197	plasma emission spectroscopy)
Glutathione-S-transferase, 258	Inductively coupled atomic plasma
Glyphosate, 267	emission spectroscopy, 240
Glyphosate, 267 Government regulations	
Glyphosate, 267 Government regulations environment, 5	emission spectroscopy, 240 Industrial effluents (<i>See</i> Industrial waste) Industrial waste
Glyphosate, 267 Government regulations environment, 5 Greenhouse effect, 258	emission spectroscopy, 240 Industrial effluents (See Industrial waste) Industrial waste disposal sites, 309
Glyphosate, 267 Government regulations environment, 5	emission spectroscopy, 240 Industrial effluents (<i>See</i> Industrial waste) Industrial waste
Glyphosate, 267 Government regulations environment, 5 Greenhouse effect, 258 Growth, 341	emission spectroscopy, 240 Industrial effluents (See Industrial waste) Industrial waste disposal sites, 309 effluent toxicity assessment, 68, 376 toxicity and food chain effects, 126,
Glyphosate, 267 Government regulations environment, 5 Greenhouse effect, 258	emission spectroscopy, 240 Industrial effluents (<i>See</i> Industrial waste) Industrial waste disposal sites, 309 effluent toxicity assessment, 68, 376
Glyphosate, 267 Government regulations environment, 5 Greenhouse effect, 258 Growth, 341	emission spectroscopy, 240 Industrial effluents (See Industrial waste) Industrial waste disposal sites, 309 effluent toxicity assessment, 68, 376 toxicity and food chain effects, 126,
Glyphosate, 267 Government regulations environment, 5 Greenhouse effect, 258 Growth, 341	emission spectroscopy, 240 Industrial effluents (See Industrial waste) Industrial waste disposal sites, 309 effluent toxicity assessment, 68, 376 toxicity and food chain effects, 126, 130–131(table), Insecticides algae sensitivity, 84(table)
Glyphosate, 267 Government regulations environment, 5 Greenhouse effect, 258 Growth, 341 H	emission spectroscopy, 240 Industrial effluents (See Industrial waste) Industrial waste disposal sites, 309 effluent toxicity assessment, 68, 376 toxicity and food chain effects, 126, 130–131(table), Insecticides
Glyphosate, 267 Government regulations environment, 5 Greenhouse effect, 258 Growth, 341	emission spectroscopy, 240 Industrial effluents (See Industrial waste) Industrial waste disposal sites, 309 effluent toxicity assessment, 68, 376 toxicity and food chain effects, 126, 130–131(table), Insecticides algae sensitivity, 84(table)
Glyphosate, 267 Government regulations environment, 5 Greenhouse effect, 258 Growth, 341	emission spectroscopy, 240 Industrial effluents (See Industrial waste) Industrial waste disposal sites, 309 effluent toxicity assessment, 68, 376 toxicity and food chain effects, 126, 130–131(table), Insecticides algae sensitivity, 84(table) impact on plant growth, 250
Glyphosate, 267 Government regulations environment, 5 Greenhouse effect, 258 Growth, 341 H 4-hydroxybenzoic, 230 H ₂ S (See Hydrocarbons) Halo-organic compounds influence on animals and plants, 258 Halone 1211, 258	emission spectroscopy, 240 Industrial effluents (See Industrial waste) Industrial waste disposal sites, 309 effluent toxicity assessment, 68, 376 toxicity and food chain effects, 126, 130–131(table), Insecticides algae sensitivity, 84(table) impact on plant growth, 250 Invertebrates, effects of contaminants, 126
Glyphosate, 267 Government regulations environment, 5 Greenhouse effect, 258 Growth, 341 H 4-hydroxybenzoic, 230 H ₂ S (See Hydrocarbons) Halo-organic compounds influence on animals and plants, 258 Halone 1211, 258 Hazard assessment	emission spectroscopy, 240 Industrial effluents (See Industrial waste) Industrial waste disposal sites, 309 effluent toxicity assessment, 68, 376 toxicity and food chain effects, 126, 130–131(table), Insecticides algae sensitivity, 84(table) impact on plant growth, 250
Glyphosate, 267 Government regulations environment, 5 Greenhouse effect, 258 Growth, 341 H 4-hydroxybenzoic, 230 H ₂ S (See Hydrocarbons) Halo-organic compounds influence on animals and plants, 258 Halone 1211, 258	emission spectroscopy, 240 Industrial effluents (See Industrial waste) Industrial waste disposal sites, 309 effluent toxicity assessment, 68, 376 toxicity and food chain effects, 126, 130–131(table), Insecticides algae sensitivity, 84(table) impact on plant growth, 250 Invertebrates, effects of contaminants, 126 K,L
Glyphosate, 267 Government regulations environment, 5 Greenhouse effect, 258 Growth, 341 H 4-hydroxybenzoic, 230 H ₂ S (See Hydrocarbons) Halo-organic compounds influence on animals and plants, 258 Halone 1211, 258 Hazard assessment	emission spectroscopy, 240 Industrial effluents (See Industrial waste) Industrial waste disposal sites, 309 effluent toxicity assessment, 68, 376 toxicity and food chain effects, 126, 130–131(table), Insecticides algae sensitivity, 84(table) impact on plant growth, 250 Invertebrates, effects of contaminants, 126
Glyphosate, 267 Government regulations environment, 5 Greenhouse effect, 258 Growth, 341 H 4-hydroxybenzoic, 230 H ₂ S (See Hydrocarbons) Halo-organic compounds influence on animals and plants, 258 Halone 1211, 258 Hazard assessment cadmium, 240	emission spectroscopy, 240 Industrial effluents (See Industrial waste) Industrial waste disposal sites, 309 effluent toxicity assessment, 68, 376 toxicity and food chain effects, 126, 130–131(table), Insecticides algae sensitivity, 84(table) impact on plant growth, 250 Invertebrates, effects of contaminants, 126 K,L
Glyphosate, 267 Government regulations environment, 5 Greenhouse effect, 258 Growth, 341 H 4-hydroxybenzoic, 230 H ₂ S (See Hydrocarbons) Halo-organic compounds influence on animals and plants, 258 Halone 1211, 258 Hazard assessment cadmium, 240 effects of marine diatom on H2 and	emission spectroscopy, 240 Industrial effluents (See Industrial waste) Industrial waste disposal sites, 309 effluent toxicity assessment, 68, 376 toxicity and food chain effects, 126, 130–131(table), Insecticides algae sensitivity, 84(table) impact on plant growth, 250 Invertebrates, effects of contaminants, 126 K,L
Glyphosate, 267 Government regulations environment, 5 Greenhouse effect, 258 Growth, 341 H 4-hydroxybenzoic, 230 H ₂ S (See Hydrocarbons) Halo-organic compounds influence on animals and plants, 258 Halone 1211, 258 Hazard assessment cadmium, 240 effects of marine diatom on H2 and CO2, 118	emission spectroscopy, 240 Industrial effluents (See Industrial waste) Industrial waste disposal sites, 309 effluent toxicity assessment, 68, 376 toxicity and food chain effects, 126, 130–131(table), Insecticides algae sensitivity, 84(table) impact on plant growth, 250 Invertebrates, effects of contaminants, 126 K,L Kinetics, 178

Landfill soil
hazard assessment, 146
Lead, 161
Lettuce, 68
Lichens, 276
Life-cycle bioassays, 365
Light and electron microscopy, 276

M

m-phenylenediamine, 287 Macrophytes, 77 Manmade chemicals disposal, 5 Marine algae species used in pesticide toxicity tests, 86(table) Marine diatom toxicity tests, 118 Marine ecotoxicology, 118 Marsh environments, plant uptake of contaminants, 172 Metabolism, 240, 250 Metal loading periphyton as indicators, 126 Metal speciation, 107 Methodology (See Toxicity tests and test methodology) Methylene blue, 383, 388(table) Metolachlor, 341 Monophenolic acids algal bioassays, 230 Municipal effluent, 68 Mutagenic effects, 297, 309

N

N-methyl-N-nitrosourea, 297 Natural sediment, 341 Nitrobenene, 355 Nitrophenol, 355 Nitrotoluene, 355 Norflurazon, 341

0

OECD (See Organization for Economic Development)
Off-shore natural gas production effects of ocean discharge, 118
On-site evaluation, 333
Organic pollutant, 209
Organization for Economic Development, 29

Oust, 101 Ozone depletion, 258

P

³²P-postlabeling, 297 PAH (See Polycyclic aromatic hydrocarbon) PCB, 178 Paraquat, 267 Pentachlorophenol, 355 Periphyton chlorophyll, 133(table), 134(fig), 137(table), 138(fig) Periphyton evaluation techniques, 126 Periphyton metal content, 142(table) Peroxidase, 101 Peroxidase inhibitors, 287 Peroxidation, 287 Pesticide toxicity tests, 83(table), 93(appendix tables), 312–313(tables) Pesticides chemical toxicity to plants, 355 techniques for plant bioassays, 197 toxicity to aquatic plants, 77, 86-89(tables) waste site, chemical analysis of soil, 312-313(tables) pH, 107, 113-115(figs) Phenanthrene, 209 Phenolic acids, 230, 235(table) m-phenylenediamine, 287 **Photosynthesis** chlorophyll fluorescence yield, 146 marine diatom, 118, 121(table), 123(table) Photoxicity, 209 Physical properties of test chemicals, 355(table) PHYTOTOX data base, 8, 49 Phytotoxic effects, 355 Phytotoxicity (plant) evaluation at hazardous waste sites, 333 higher plants—effluent toxicity assessment, 68 pesticide effects, 197 polycyclic aromatic hydrocarbons, 209 soil-based plant tests, 29 test results, 72(table) tests and testing, 5, 7(table), 333, 355, Pica abies, 258 Plant activation, 287, 318 Plant bioassays (See also Bioassays)

cyanophage/host assay for toxicity, 383

for assessing effects of toxic chemicals, 365	Rooted plants in wetland ecosystems, 341 Ruggedness test, 217, 222–223(tables)
for assessing uptake of contaminants, 172	
to predict effects of chemicals, 12	S
toxicity assay, 146	5
with pesticides, 197	Sago pondweed, 267, 272(table)
Plant cell/microbe coincubation assay, 318	Salmonella assays, 28, 318
Plant cell systems, 287	Saltbush, 297
Plant cell suspension cultures, 240	Screening, 376
Plant cell systems—promutagen activation,	Sediment, 341
287	Sediment sampling, 172, 173(table),
Plant-chemical interactions	343(table)
need for more data, 250	Sediment toxicity tests, 341
Plant emergence, 29	Seed germination, 333, 336(table), 341, 376
Plant growth, 355	Seed germination/root elongation toxicity
Plant life cycle, 333	test(EPA, EG-12), 365
Plant metabolism, 250, 318	Seedlings
Plant peroxidase (POD) activity, 101	emergence, 197, 202(table)
Plant promutagens, 319(table)	growth, 365
Plant stress, 161	survival, 341
Plant tests (See also Toxicity tests and test	Selenastrum, 107, 118, 217, 228(table)
methods)	Sewage, 383
cadmium toxicity, 161	Short lifecycle, 365
soil-based, 29	Site assessment and remediation, 333
test results on 43 chemicals,	Sludges, 12, 383 (See also Sediment)
34–37(tables)	Sodium dodecyl-benzenesulfonic acid, 355
Plant tissue culture, 250, 254–255(tables)	Soil-based plant tests, 29, 217, 309, 333
Plant toxicity	Soil toxicity, 146
tests and testing, 5, 6(table), 12 Plants	Soils, 217, 220(tables), 228(table)
DNA adduct determination, 297	Solar radiation, 209
effects of chemicals on plant behavior,	Soybean, 355
60	Spartina alterniflora, 341
genetically engineered, 41	Spectroscopy, 240
influence of halo-organic compounds,	Spruce, 258
258	Stream toxicity assessment, 126
use for toxicity testing, 41	Sublethal stress, 101
Pollutants, 240, 276, 341	Sulfides
Polycyclic aromatic hydrocarbons	toxic effects on marine photo-plankton,
Pondweed, 267	118
Potamogeton pectinatus, 267	Sulfometuron methyl, 101
Product labeling, 12	Surflan, 333
Preregistration testing, 77	Suspension cultures, 250
Promutagens, 287, 318	Superfund sites, 309 Survival, 341
Proportional amendment, 217, 224(table),	Synthetic sediment, 341
226–227(table)	Syringic, 230
	ojimgio, 200

R

Regulatory protocols, 107 Rice, 68

Terrestrial plants, 41 Terrestrial systems effects of chemicals, 12

T

Test conditions	electron microscopy, 276
chlorophyll fluorescence toxicity assay, 146	herbicide effects on aquatic plants, 267, 341
selenastrum, 107	high plants, 68
higher plants for toxicity assessment,	overview, 5, 9(table)
69(table)	peroxidase inhibitors, 287
water quality of test samples, 71(table)	physical properties of test chemicals,
Test methods (See Toxicity tests and test	357(table)
methodology)	phytotoxicity, 333, 360(table), 362(table)
Test species, 9(table), 77	plant tissue culture, 250
Test systems for ecological risk assessment,	short-term photosynthesis, 118
41, 240	toluene, 240
Tests and test methodology (See Toxicity	tradescantia micronucleus assay, 309
tests and test methodology)	use of marsh plants, 341
Thiourea, 355	using chemostat-grown green alga, 107
Tissue culture	water and sediment, 341
method for xenobiotics biotrans-	x-ray microanalysis, 276
formation, 250	Toxicology, 118, 209, 287 (See also
Tobacco cells in plant cell/microbe	Ecotoxicology, Toxicity tests and
coincubation assay, 318	test methodology)
Toluene, 240	Tracer fate tests
Toxic chemicals	with plant cell cultures, 240
cadmium, 161	Track-sprayer, 197
effect on photosynthesis efficiency, 146	Tradescantia micronucleus assay, 309,
toluene, 240	314–315(tables)
Toxicity (See also Toxicity tests and test	Transpiration, 355
methodology)	Tributyl-phosphate, 355
cadmiums, 161	Trichloroacetic acid, 355
chlorinated hydrocarbons, 178	Trichlorophenol, 355
chlorophyll fluorescence assay method,	Tropical legumes, 376
146	
food-chain effects, 126	${f U}$
off-shore natural gas production	
effects of waste gases on marine life,	U. S. Food and Drug Administration
118, 101	(FDA) (See Food and Drug
pesticide effects on aquatic plants, 77	Administration)
photosynthesis short-term testing, 118	Ultraviolet radiation, 209
toluene, 240	UV radiation (See Ultraviolet radiation)
Toxicity assessment	Unicellular green algae
aflatoxin B1 and benzo(a)pyrene, 318	test species for pesticide toxicity, 77
cadmium, 240	
industrial effluents, 376	${f v}$
periphyton communities, 126	
phytotoxicity at hazardous waste sites,	Vanillic, 230, 237(table)
333	Vascular plants, 5
toluene, 240	Vegetative vigor, 197
use of plants, 41, 68, 309, 341	Vigor index, 376
water, wastewater, sludges and	Viricides, 383
composts, 383	487 W7
Toxicity tests and test methodology	W,X
aneuploidy-inducing agents, 326	***
aquatic plants—herbicide response, 267	Waste gases
cadmium, 240	effects on marine life, 118
chlorinated hydrocarbons, 178	Waste incineration, 161

Wastewater
cyanophage/host assay, 383
effect on germination, 379–380(tables)
physico-chemical characteristics,
378(table)
toxicity assessment, 383
Water contamination—bioassay, 217
Waterborne pollutants, 341

Wetland ecosystems, 341 Wetland plants, 341 Wetlands plant uptake of contaminants, 172 protection, 267 Wheat seedling assay, 326

Xenobiotics, 240, 250, 287