Subject Index

A

Agricultural pesticides, oil-based, 56 - 64Airblast injector, 116 (illus) Alfalfa spraying, 32 Anopheles, 6 Anopheline larvae, 6 Ants, Argentine, 7, 10 (table) Aphid, apple (Aphis pomi DeGeer), 25, 27 (table) Applicators, 29 (see also Droplet applicators; Sprayers) aircraft, 85, 88 (illus) Arboviruses, 6 Arrhenius equation, 51 (table), 52-54 ASTM Subcommittee E29.04 on Liquid Particle Measurement. 115 Atrazine flowables, 71 (table), 75-76 (tables), 76

B

Bacillus thuringiensis israelensis (BTI), 6 efficacy of, 10 (table) exposure of mosquito larvae to, 9 (illus) Beads, glass, 130, 131 Benefin, 4-5 Biological testing, 14, 21 Bleeding, 74, 75 Bloom tests, 74, 76

С

Calibration graticle, 130-131 Calibration media, 96-97 California viral encephalitis, 6 Carbaryl flowables, 71-73 (tables) Carbohydrate oils, 56 Carboxymethyl cellulose (CMC), 66 types, 67, 71, 73-76 Cascade impactor, 95 Caterpillar, 134-135, 140 Chlorpyrifos, 7 efficacy of, 10 (table) Cockroaches, efficacy of pesticides against, 7, 10 (table) Computer to control droplet size, 22 in droplet sizing, 109 to generate droplet-size parameters, 98 in light scattering technique, 106 to measure fringe pattern, 122 Corn cob fraction carrier, 8-9 (illus) Co-suspending agents cost comparison, 73 (table), 76-77 water soluble polymers, 65-77 Culicidae, 6 Culcine, 6 Cyhexatin, 24, 26 effects of direct sprays, 27 (table) effects of residues, 26 (table)

D

DDT, 24 Deltamethrin, 24

149

Dicotyledons, phenoxy-resistant, 4 Diluent oils, 38, 40 (table) composition, 41 (table) residual weight percent, 48-50 (tables) viscosities, 44-45 (tables) viscosity-temperature relationships, 53 (table) viscosity-volatility relationships, 51 (table) Dipping-needle technique, 14 Disk piezoelectric, 20 spinning, 14 Dose response effects, evaluating, 21 Drift potential, 24 (see also Wind deposition) Droplet application (see also Droplet sizing instrument; Impulse droplet generator) equipment, controlled, 14 characteristics of, 19-20 limitations of, 20, 21-22 practical applications, 20-21 single-droplet, 14 Droplet applicator, control (CDA) effect on droplet patterns, 24 (table) spraying techniques, 23-24 **Droplet** atomization atomizers (see Spray, agricultural atomizers) electrostatic, 57, 58, 64 monosize technique, 24, 136 process, 62 research on, 84 rotary, 144-146 Droplet sizing analyzers (see Droplet sizing instrument) data evaluation and interpretation, 98-100 impact on pesticide application, 81

laser droplet interferometry approach, 114-127 (see also Lasers) light scattering techniques in, 102-107 (see also Light scattering techniques) PMS system, 134, 141 equipment characterization, 135-139 field assessment, 139-140 imaging spectrometer, 128-133 size-frequency analysis, 83-93 techniques, 81 evolution of, 95 technology, 95-97 Droplet sizing instrument, 18, 61-62 (see also Laser) data. 58 development of, 108-113 imaging spectrometer (PMS), 128 - 133optical, 108-109, 109 (illus) versus nonoptical, 95-96, 96 (table) progress in, 94-101 selection and procurement, 97 spray analyzer (PMS), 134-141 system, 111-112 (illus) use of, 81, 97-98 Droplets controlled production and placement, 13-22 diameter size (see Number median diameter; Sauter mean diameters; Volume median diameter) distribution, 137-141 effect on pest control efficiency, 23-28 evaporation, 38, 50, 52 (illus) "firing," 18 formation of single droplet, 16, 17 (illus), 132 success, factors determining, 19 - 20

typical hydrostatic pressure cycle for, 19 (illus) fringe pattern, 120-123 satellite, 22 size, 38, 50 (see also Droplet sizing) control of, 14, 18-19 distribution, 62-64, 91, 95, 96, 102-107, 142 effects of, 14 predicting, 22 range, 18 (illus) 85, 87 (illus), 89-92 (illus), 92, 94, 146 sampling size and, 145 (table) shape, 108 significance of, 94 velocity profiles, 105, 115, 125, 126 (illus), 129, 132, 133 (illus) size-frequency analysis, 83-93 spectrum, typical, 18 (illus) uniformity, 13, 14, 18-19 velocities, 62 size and, 105, 115, 125, 126 (illus), 129, 132, 133 (illus) Duncan's New Multiple Range Test (DNMRT), 25 Dursban, 7

E

Electrodyn sprayer, 15, 133 Endotoxin, protein, 6

F

Fenvalerate, 24 effects of direct sprays, 26 (table) effects of residues, 25 (table) Formulation (pesticide) containing carbaryl, 71, 71-73 (tables) development and quality control, 133 granular, 5-6, 7, 10 (table) parameters, effects on pest control efficiency, 23-28 for prescription performance, 3-12 speciality, 3, 4, 11 used in viscosity/volatility study, 40 (table) composition of, 41 (table) Freeze-thaw stability, 74, 76 Freeze-thaw tests, 76

G

Granular mosquito larvicide, 5-6

H

Hemileuca olivae (Cockerell), 134 Herbicides, 65 (see also Pesticides; specific herbicides) atrazine flowable, 75-76 (tables) Hormoligosis, 26 Hydrocarbons, 56 Hyperexatation response, 28

I

Imaging techniques, 62, 64 droplet sizing and, 95 (see also Droplet sizing; Droplet sizing instrument) optical methods, 116 nonintrusive, 108-109 PMS probe, 86 (illus) two-dimensional spectrometer, 128-133 Imax method, 118-120 Impulse droplet generator, 15 (illus) limitations and prospects, 21-22 liquid properties, 20 practical applications, 20-21 pulse characteristics, 19-20, 22

Impulse jets, 15 principle of operation, 15-16
Ink jet technology, 14, 20, 22 (see also Impulse jets) principles of, 14-15
Insecticides, 65 (see also Pesticides) in nonvolatile diluent oils, 37 undiluted liquid, 37

J

Japanese beetle (*Popillia japonica* Newman), 25, 27 (table) Jets electrostatically driven, 15 impulse (*see* Impulse jets)

K

Kaolin clay, 9 Knox Out, 7

\mathbf{L}

Larvicide, granular mosquito, 5-6, 10 (table) Laser (see also Droplet sizing instrument; Light scatter technique) beam behavior, 105 Doppler velocimeter (LDV), 117 droplet interferometry, 114-127 limitations, 116 gas, 109-110 imaging system, 142-146 PMS, 18, 20, 22, 84 replacement, 106 ruby, 81, 84, 87 Light scatter technique, 84, 116, 117 (see also Laser) alignment difficulties, 106 calibration, 106 computer process, 106 constraints and precautions, 102-107

limitations, 105

mathematical analysis, 103-104 sampling problem, 104-105 Lima bean disks, Henderson, 24, 25 Liquids (*see* Diluent oils; Nonvolatile oils; Viscosities; Volatilities)

M

Malvern Model ST1800 analyzer, 102, 103 (illus), 104 Microchip electronics, 84 Microsyringe, 14 Mistblower, 135-136, 138-139 Mist sprayer, 135, 138 Miticide, 26-27, 28 MKIII, 61, 62 Mosquito larvae efficacy of granular formulations against, 10 (table) feeding behavior, 6 view of midgut, 8-9 (illus)

N

Nonintrusive single-particle counter (NSPC), 118, 119 (see also Imax method) Nonvolatile oils, 54 phytotoxicity, 37 viscosity-temperature relationships, 53 (table) Nozzles (see also Sprayers) air-atomizing, 110 analysis of assemblies, 100 aperture width effects, 144, 146 flow rates, 90-92 hollow cone, 90-92 (illus), 99 (illus) jet, 30-32 tests, 90 types, 90-92 Number median diameter (NMD), 85,90

0

Organophosphate, 7 Oxadiazole herbicide, 4 Oxadiazon, 4, 5 comparative performance of, 5 (table)

P

Packing, 74 Permethrin, 25, 140 effects of, 27 (tables) encapsulated, 27, 28 Pest control (see also Insecticides; Pesticides) efficiency, 23-28 equipment, 29, 30 (see also Applicators; Droplet applicators; Sprayers) integrated pest management (IPM), 134 strategies, 23 structural, 7-11 Pest control operator (PCO), 7 Pest/droplet interaction, 24 Pesticides (see also Formulations; Pest control; specific pesticides) active ingredient (A.I.), 30 agricultural, 56-64 application research, 32-36, 83-84.134-141 delivery mechanisms, 23 (see also Applicators; Droplet applicators; Sprayers) direct injection, 35 direct metering of concentrations, 29-36 evaporation, half-life, 45, 46, 47 (table), 50 (table), 52 (illus) flowable aqueous, 65 co-suspending agents for, 65-77

need for uniformity of total dosage, 13 residual weight percent, 48-50 (tables), 50, 52 (illus), 54 variation with time, 43 (illus) Phagostimulants, 6 Phase/Doppler spray analyzer technique, 120-125 Photodiodes, 105 Photography, high-speed, 22, 95 Plant/droplet interaction, 24 Polymers high-viscosity, 74 water soluble, 65-77 Pyrethroids, synthetic, 24, 27, 28

R

Redistribution phenomena, 24 Resistivity, 24 Resurgence phenomena, 27 Roping, 74, 76

S

Sandyland Experiment Field, 32 Sauter mean diameters, 98, 99 (illus), 117 Scanners, automated, 83-84 Spectrometer, two-dimensional imaging, 128 application to system spray studies, 132-133 calibration, 130-131 general operation of, 129 limitations of, 129-130 Spray agricultural atomizers, 85, 87, 90-92, 144-146 analysis laser imaging system, 142-146 PMS system in pesticide application research, 134-141 concentrated versus dilute, 24, 26 deflector cone system, 112 (illus)

Spray (cont.) deposits, estimating, 21 diluents and adjuvants, 40 (table), 44-45 (tables) (see also Diluent oils) distribution studies, 21 drop size analyzers (see Droplet size analyzers) drop size-frequency analysis, 83-93 imaging spectrometer studies, 132 mixtures, forestry compositions, 41 (table) viscosities, 37, 42-54 viscosity-temperature relationships, 39, 42-54 volatilities, 37-42, 44-54 patterns, 88 (illus) Sprayers (see also Droplet applicators) boom, 29 Electrodyn, 15, 133 exhaust, 135, 139 ground, 140 Herbi, 24, 25, 26 Hesston 500 swather, 32-36 injection nozzle, 30 jet nozzle design, 30-31 mixing characteristics, 32 Micron, 24, 25, 26 mist, 135, 138 nozzle distribution patterns, 32, 34 nozzles (see Nozzles) Spray Triode Agricultural (STAg), 57 design, 57 (illus), 58-61 droplet sizing, 61-64 nozzle performance, 113 zirconia/tungsten setaceous emitter material, 59-61 Spraying electrostatic, 56-64

ultra-low-volume (ULV), 37-38, 54 Suspension tests, 74, 76

Т

÷,

Tetranychus urticae Koch (TSSM), 24-27 Thixotropes, inorganic, 77 Toxicants patterns, 26 use near residential and commercial properties, 7 Turf herbicides, preemergent, 4-5 (see also Herbicides) Turfgrass, 4 performance of oxadiazon formulations on, 5 (table)

U

Unimorph, 15

V

Van Gel B, 71 (table) Van Gel B/CMC, 66-67, 68-70 (illus), 72-73 (tables), 73-74, 76 Van Gel B/Hercules WSP blends, 66 Van Gel B/Xanthan gum blend, 66, 68-70 (illus), 73, 75-76 Viscometer, Ostwald, 42 Viscosities Brookfield, 71-73 versus yield, 66, 67-70 (illus) defined, 38 measurements, 42, 44-45 (tables) forestry spray mixtures, 37-39, 42 - 54stability, 72 (table), 75 (table)

Viscosity-temperature relationships, 39, 42-51 volatilities and, 52-54 Volatile carrier vehicles, 38 Volatilities categories of, 46 measurement of, 38 droplet method, 40-42, 44-46, 47 (table) gravimetric method, 39-40, 44-46, 47 (table) forestry spray mixtures, 37-42, 44-54 viscosity-temperature gradients and, 52-54 Volume median diameter (VMD), 85-86, 90-91, 98, 136, 138

W

Wind deposition, 135, 138-139 Wind tunnel test procedures, 89-90

Y

Yield value, 66-67 Brookfield, 67 (illus), 69-70 (illus), 71 Haake, 68 (illus)