Designation: E1102 – 91 (Reapproved 2015)

Standard Terminology Relating to Agricultural Chemical Application[1]

This standard is issued under the fixed designation E1102; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 The purpose of this terminology standard is to establish uniformity in terms used in the field of agricultural chemical application. Terms are adopted from related fields and where applicable from Terminology E609.

1.2 The terms are appropriate to any agricultural chemical application. Units in parenthesis following a definition are meant as typical and are not exhaustive of all units available for the term.

2. Referenced Documents

2.1 *ASTM Standards:*[2]
E609 Terminology Relating to Pesticides

3. Terminology

GENERAL CHEMICAL TERMS AND CHARACTERISTIC MEASUREMENTS

air flow rate—the flow rate of air, expressed in volume per relevant unit (ft^3/min, m^3/s, m^3/tree).

application rate—the amount of any material applied per unit treated:

*active chemical rate—*the amount of active ingredient (a.i.) applied per unit treated, expressed in terms of mass per relevant unit treated. (For area treatment, kg a.i./ha, lb a.i./A, or oz a.i./1000 ft. of row; for space application, mg a.i./m^3, or oz a.i./1000 ft^3; for individual units, kg a.i./plant or animal).

*formulation rate—*the amount of chemical formulation applied per unit treated, expressed in terms of mass or volume per relevant unit treated. (For area treatment, kg/ha, lb/A, or oz/1000 ft of row; for space application, mg/m^3, or oz/1000 ft^3; for individual units, kg/plant or animal).

*spray rate—*the amount of spray liquid emitted by an application unit during treatment, expressed in volume per unit treated. (For area treatment, L/ha, or gal/A; for space treatment, mL/m^3, or oz/1000 ft^3; for individual units, L/plant, mL/animal, or gal/tree).

concentration—amount of the active ingredient contained in the chemical formulation expressed as a percent or mass per relevant unit basis.

cumulative droplet diameter ($D_{v.1}$ and $D_{v.9}$)—diameter of drop such that 10 % and 90 %, respectively, of the liquid volume is in drops of smaller diameter.

deposit rate—the amount of any material deposited per unit area.

*active chemical deposit rate—*the amount of active ingredient deposited per unit area.

*formulation deposit rate—*the amount of formulation deposited per unit area.

*spray deposit rate—*the amount of spray liquid deposited per unit area. Mean deposit rate is the average amount of deposit over the entire spray swath. Effective spray deposit rate is the mean deposit from center to center of adjoining swaths.

diluent—a gas, liquid, or solid used to reduce the concentration of an active ingredient in the formulation or application of a pesticide (see Terminology E609).

drift—the movement of chemicals outside the intended target by air mass transport or diffusion.

*airborne drift—*the dispersion of chemical particles to the atmosphere outside the intended target.

*particle drift deposits—*the deposition of chemical particles outside the intended target.

*vapor drift—*the dispersion of vaporized chemical to the atmosphere and areas surrounding the target area during and following application.

formulation—the form in which a chemical is offered to the user.

[1] These terminologies are under the jurisdiction of ASTM Committee E35 on Pesticides, Antimicrobials, and Alternative Control Agents and is the direct responsibility of Subcommittee E35.22 on Pesticide Formulations and Delivery Systems.

Current edition approved Oct. 1, 2015. Published November 2015. Originally approved in 1986. Last previous edition approved in 2009 as E1102 – 91(2009). DOI: 10.1520/E1102-91R15.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

mean droplet diameter ($\bar{D}_{pq}$)—is represented by the following:

$$\bar{D}_{pq}^{(p-q)} = \frac{\sum D_i^p}{\sum D_i^q} \quad (1)$$

where:

D_i = the diameter of the i^{th} particle,
$\sum D_i^o$ = the total number of drops in the sample. Thus:
$\bar{D}_{10}$ = length mean diameter,
$\bar{D}_{20}$ = area mean diameter,
$\bar{D}_{30}$ = volume mean diameter,
$\bar{D}_{31}$ = volume/length mean diameter (mean evaporative diameter),
$\bar{D}_{32}$ = SAUTER mean diameter, and
$\bar{D}_{43}$ = DeBROUKERE or HERDAN mean diameter.

median droplet diameter (D_{xf})—For cumulative distributions, D_{xf}, where x is V, A, L, or N, are diameters such that the fraction (f) of the total of volume, surface area, length of diameter, or number of drops respectively, is in drops of smaller diameter.

Thus:

$D_{V.5}$ = volume median diameter,
$D_{A.5}$ = area median diameter,
$D_{L.5}$ = length median diameter, and
$D_{N.5}$ = number median diameter.

Also, $D_{V.1}$ and $D_{V.9}$ = diameter of drop such that 10 % and 90 % respectively, of the liquid volume is in drops of smaller diameter.

percent nozzle pattern overlap—calculated by subtracting the nozzle spacing from the single nozzle pattern width and then dividing by the nozzle spacing and multiplying the result by one hundred.

spray classification—classification of sprays by droplet size.

aerosols—distribution of droplets with $D_{V.\ 5} \leq 50$ µm.

mists—distribution of droplets with 50 µm < $D_{V.5} \leq 100$ µm.

fine sprays—distribution of droplets with 100 µm < $D_{V.5} \leq 400$ µm.

medium sprays—distribution of droplets with 400 µm < $D_{V.5} \leq$ 1200 µm.

coarse sprays—distribution of droplets with $D_{V.5} > 1200$ µm.

sprayed width per nozzle—the effective width sprayed by a single nozzle. (For broadcast spraying it is the nozzle spacing; for band spraying it is the band width, for row crop spraying it is the number of nozzles per row divided by the row width).

swath, effective width—the center to center distance between overlapping broadcast applications.

TYPES OF APPLICATIONS

band application—an application of a pesticide to a continuous restricted area such as in or along a crop row rather than over the entire field area (see Terminology E609).

basal application—application of a chemical to the base of a plant.

baseboard application—application to a building on the lower portion of the inside walls.

broadcast application—an application of a material over the entire area of a field.

crack and crevice application—application by a means that projects the material into cracks and crevices of a structure.

dip application—application by direct immersion.

directed application—an application to a restricted area such as a row, bed, or at the base of plants (see Definitions).

foliar application—application of a chemical to the stems, fruit, leaves, needles, or blades of a plant.

pour-on application—application by pouring a chemical onto the target.

run-off application—application of a liquid material using sufficient volume such that it begins to drip from the target.

soil injection—the mechanical placement of a pesticide beneath the soil surface with a minimum disturbance of the soil (see Terminology E609).

space application—dispersion of liquid, gas, or dry particles in an air space in such a manner that target pests are exposed to the chemical.

spot treatment—application of a chemical to a small restricted area, usually to control the spread of a pest.

APPLICATION APPARATUS

aerosol generator—any mechanical or thermal device that produces a liquid dispersion having a volume median less than 50 µm.

air carrier sprayer—an apparatus consisting of a pressure source and controls for the spray liquid and a blower with suitable ducts to produce an air jet in which spray nozzles are located. Air from the blower carries the spray for a distance for deposition on the target being treated.

boom sprayer—a sprayer apparatus consisting of a pressure source and controls, and employing a boom (vertical or hotizontal) with atomizers (hydraulic, rotary, or other) arranged to provide uniform coverage of the treated surfaces.

bucket pump sprayer—a sprayer apparatus consisting of a manually operated pump that may be held or mounted in a bucket containing the spray solution. The pump is connected to an atomizing device that forms and distributes the spray.

compressed air sprayer—a spraying apparatus that uses air pressure to move liquid from a container through an atomizing device.

granular applicator—an apparatus consisting of a hopper, a metering device, and a device for spreading or placing the granules in the target area.

high-clearance sprayer—an apparatus consisting of the components of a boom sprayer mounted on a self-propelled vehicle whose frame is constructed to permit the vehicle to pass over plants with minimum damage.

hose end sprayer—an apparatus designed to be attached to standard garden hose, consisting of a hand-held container for spray mixture with an integral metering head through which water from the garden hose flows. The metering head uses water pressure, siphon effect, or some other water powered means to meter the spray mixture into the water stream which is then atomized.

knapsack sprayer—a sprayer apparatus, carried on the operator's back, consisting of a spray solution tank, pressure source, and an atomizing device that forms and distributes the spray. Spray pressure is supplied by a lever operated manual or engine powered pumps or a compressed air tank. Some knapsack sprayers have air carrier blowers to distribute the spray.

slide pump sprayer—a sprayer consisting of a telescoping pump operated by both hands. On the outlet end of the pump is mounted a spray nozzle. On the inlet of the pump is attached a line leading to a container containing the spray solution.

sprayer attachment—an apparatus consisting of the individual components of a sprayer (tank, pressure source, pressure controls, spray liquid lines, pressure nozzles, etc.) in an arrangement to permit its mounting on another implement to permit application of spray at the same time another field operation is performed.

thermal vaporizer—an apparatus consisting of a container for chemical and a heater to maintain the vessel at a temperature sufficiently high to accelerate evaporation of the pesticide. The apparatus may contain a blower to disperse the pesticide vapor into a treated area or may rely upon natural turbulent diffusion for dispersion.

wheelbarrow sprayer—a sprayer apparatus mounted on a frame with wheelbarrow-type handles and one or two wheels.