

CHAPTER 9
Herbicide
Delivery Systems

Systems available for the herbicide application can be broken into two general categories — ground-based and aerial spray systems.

**GROUND-BASED
 SPRAY SYSTEMS**

Ground-based systems allow exact placement of herbicides and minimize downwind drift. Ground sprayers are employed in areas occupied and controlled by friendly soldiers on terrain traversable by the spray apparatus. A 500-meter buffer distance is recommended between the treated area and desirable vegetation. Applications are not made near desirable vegetation, in winds over 10 knots, or if it is about to rain. See Appendix D for a listing of ground sprayers.

Several hand-operated pump and pressure sprayers are available to deliver limited amounts of herbicides. Hand sprayers are suitable for spot spraying and for applying spray close to desirable vegetation. Sprayers could include sprinkling cans, compressed air sprayers of 1 to 5 gallon capacity, and knapsack sprayers with hand-operated pumps. Compressed air and knapsack sprayers are well adapted for herbicide use along highways, runways, or railroad tracks. A cone-type nozzle on a hand sprayer delivers 2.5 to 6 gallons per hour at 20 to 30 pounds per square inch (psi). If devices are issued for insect control purposes, clean them thoroughly after each use so that crops and vegetative camouflage are not damaged when they are used to spray insecticides.

Boomless sprayers with nozzle clusters are well adapted for spraying roadsides and ditch banks, under utility lines, and along fence rows. They are less

expensive, simple to operate, and have less nozzle trouble than boom sprayers. They can pass between trees, maneuver close to obstacles, and are practical for rough terrain. They spray a broad swath of 20 to 30 feet with large volumes that provide moderately good coverage. The conventional equipment consists of a piston-type hydraulic sprayer equipped with 3/4-inch high-pressure hose and a 15 gallon-per-minute (gpm) pump for a 3/16-inch nozzle opening. Thirty-five to 60 gpm pumps are used for 1/4 inch, 5/16 inch, and 15/16 inch nozzle openings. The equipment is mounted on wheeled vehicles and the spray stream is greatly affected by the wind.

Truck-mounted boom sprayers are adapted for large areas where complete coverage is necessary, such as airfields, railyards, and depots. Arm booms are available for roadside and ditch spraying. Mounting the nozzles off-center enables the operator to spray 15 to 20 feet to one side. Use a larger boom mounted vertically to treat taller vegetation. Handguns at about 100 psi can vary delivery from a broad mist to a narrow coarse stream from a stationary truck to reach into tight spaces. Higher pressures will increase drift and reduce delivery effectiveness.

Mist blowers are power-driven systems that disperse highly concentrate sprays. The herbicide is carried principally in an air stream instead of a liquid. These sprayer are free from boom and nozzle troubles and are very useful against weeds and woody plants in

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swamps and rocky areas along roadsides and under power lines. Mist blowers use very little water and cover vegetation rapidly. They are used to treat areas inaccessible to hydraulic power equipment and cost less. Mist blowers in sizes of 5 to 12 horse power (hp) are useful for brush treatment when drift is not a problem. A 2-hp knapsack mist blower is effective against brush up to 30 feet tall for spot spraying and for retreating.

Any combination of pumps and spray nozzles may be mounted on any vehicle that has the capacity to transport them and the herbicide to the site of application and may be used as ground field expedients. Expedient systems are also used to spray fuels to burn treated or untreated vegetation. A standard highway watering truck can be adapted for herbicides by equipping it with a loading pump to circulate the spray material and standard asphalt nozzles that deliver a fan spray. Power-driven decontamination apparatuses (PDDA) are self-contained spray systems used to apply decontaminants. The M12A1 and the M17 lightweight decontamination system (LDS) are both adaptable for vegetation control. Tank capacities range from 200 to 1,250 gallons. The M12A1 also has a 35 gpm pump that can be remoted out from the prime mover to pump herbicides to pressures up to 800 psi. Delivery is made through two hoses with adjustable nozzles. The PDDA can be used to control vegetated minefield, defensive perimeters, airfields, and roadsides. Applications are made at volumes of 50 to 100 gallons per acre (as required) to completely wet the foliage. After using PDDAs for herbicide operations, clean them thoroughly to prevent damage to seals, hoses, and pumps. Once PDDAs have been used to deliver herbicides, they are no longer safe for transporting drinking or shower water. The PDDA is tagged with a warning and the warning is entered in the logbook.

AERIAL SPRAY SYSTEMS

Aerial spray offers rapid treatment of large areas for quick results at a lower cost. It also allows treatment of inaccessible areas and areas under enemy control. The obvious advantages of aerial spray systems are offset to some degree by the hazards to the pilot and the damage from the drift. A helicopter needs no runway and can fly better at low altitudes and in low visibility than fixed-wing aircraft, but at greater risk to the crew. For helicopter and small fixed-wing

aircraft, area coverage is less than 5,000 acres per sortie. To achieve predictable herbicide deposit, aircraft should fly into the wind under conditions as calm and stable as possible. See Appendix D for a partial listing of spray systems.

The only large fixed-wing aerial spray capability in DOD is maintained by the USAF in the Air Force Reserve. Specially modified C-130H Aircraft are equipped to use the Modular Aerial Spray System (MASS). The MASS can carry 2,000 gallons of spray liquid and can be configured to use wing and/or fuselage booms. The MASS has the capability of applying liquid from one-quarter ounce to 30 gallons/acre. Droplet sizes sprayed can vary from as little as 20 microns for ultra-low volume missions to as much as 3,000 microns for ultra-high volume missions. For aerial spraying, the C-130H is normally flown 200 knots constant ground speed 100-150 feet above the ground.

The US Army Pesticide Dispersal Unit (PDU) is a multi-capability unit that can be slung from the cargo hook of any helicopter using a six-foot nylon strap. It can be used to deliver liquids or solids and is configured in the high-volume mode using a 33.75-foot boom with up to 34 nozzles. The PDU operates in the ultra low-volume mode using a six-foot boom with two rotary atomizers and in the solid mode using a rotary disc slinger. The unit is self-powered by a 10 hp engine and is remote controlled by helicopter crew. The PDU has a liquid payload of 150 gallons and flow rates range from 0.48 gpm to 52.4 gpm. Since the PDU is an external load, contamination, jettison, and refilling problems are solved. The unit attaches in 15 seconds to all UH-1, UH-60, OH-58, and CH-47 helicopters. It is issued to preventive medicine units for pest control and can be used for herbicide operations along lines of communication, restrictive terrain, and in heavy vegetated areas to enhance intelligence collection and security.

A number of field expedient devices have been used in helicopters to spray small areas such as fields of fire around defensive perimeters, helicopter landing zones, and small crop destruction missions. These devices range from a 55-gallon drum equipped with a spray bar for temporary mounting across the skids of a UH-1 helicopter to a 400-gallon metal tank or 500-gallon collapsible fuel bladder with power-driven fuel transfer pumps and improvised booms for use on CH-47s.