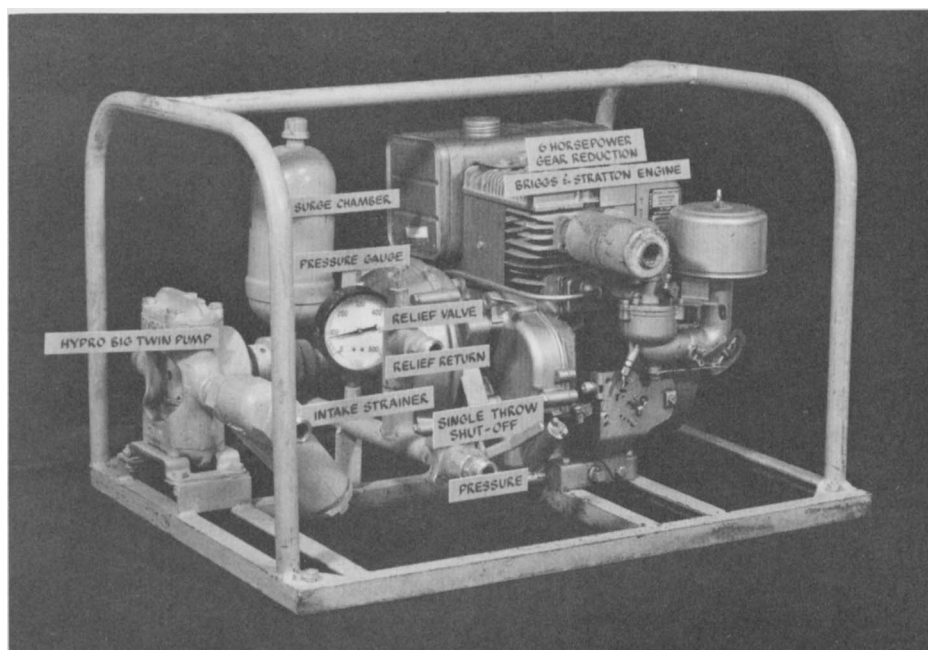


PORTABLE SPRAY MANY FARM AND



Washburn Agricultural Service Portable Spray pump unit with component parts labelled.

FOR A NUMBER OF YEARS, many investigators in California have recognized the need for a portable, lightweight, low cost, effective spray unit that could be used in a variety of field tests—involving chemical treatment of livestock and poultry, barns and similar farm structures, accumulations of animal manures, as well as for field and row crops. A sprayer with such qualifications was needed to eliminate extensive time frequently required to calibrate, adjust, and repair local spray equipment when used in test work. Also needed as a sprayer with which multiple chemical or dilution applications could be made to test units without stopping to clean and refill tanks (as is necessary with conventional farm sprayers).

Such a spray unit was designed and constructed in 1967 by Washburn Agricultural Service, Davis, by modifying an original prototype developed in 1964 by the Agricultural Extension Service for use in experimental weed control. The final design is described here with comments on the adaptability of the sprayer for various uses.

The pump unit (photo) was placed within a 20-by 28-inch frame made from 1-inch angle iron and with 1-inch conduit tube to provide 18-inch high protective supports on each end. The pump unit contains the following equipment listed in order of flow from the spray tank:

(1) a $\frac{3}{4}$ -inch entry pipe with a line strainer and removable bottom plug for easy cleaning; (2) a Hypro Big Twin

piston pump (Model C5, 210-B) with maximum delivery of 10 gpm at 600 rpm; (3) a 6HP, 3600 rpm Briggs and Stratton gasoline engine with a 6 to 1 gear reduction assembly (600 rpm) connected by a flex coupling to the pump; (4) a Hypro Air Chamber (surge tank); (5) a 600-lb pressure gauge installed on the exit pipe; followed by a Spraying Systems pressure relief valve to establish correct pressure at the delivery nozzle and to direct excess pressure (flow) by means of a bypass return line to the spray tank (the latter provides spray tank agitation); and (6) a shut-off valve immediately behind the $\frac{3}{4}$ -inch hose coupling.

The pump and power assembly was constructed as a separate unit, apart from a spray tank, since test applications usually involved small amounts of insecticide. Metal, 30-to 50-gallon capacity drums were used with this sprayer for most applications; however, 3-gallon buckets or 400-gallon tanks could be used in place of the metal drums if such amounts of spray material were needed.

High pressure (800 psi) $\frac{3}{4}$ -inch OD hoses equipped with $\frac{3}{4}$ -inch brass connections were used as a safety feature and for ease in replacement of washers and fittings. A 10-foot suction hose was equipped with a coarse, metal strainer on the end inserted into the spray tank. A 7-foot long by-pass hose, as well as one 15-ft, and two 50-ft spray hoses, were included with the pump unit. A hose reel was added to facilitate care, maintenance and handling of the 50-foot spray hoses; another 7-foot hose was necessary to connect the spray-tank end to a 4 ft long, $\frac{3}{4}$ -inch diameter conduit containing a Tee-Jet $\frac{1}{4}$ -inch U807 spray nozzle. The tank end of the conduit was bent at a

UNIT SERVES RANCH PURPOSES



Spray unit mounted on battery-powered cart for insecticide applications inside a poultry house.

right angle so that the discharge provided agitation across the tank bottom. The conduit was held upright to the drum top by a 1-inch bung (center drilled) and clamp.

The pump unit, hoses, and spray tank can be loaded easily into a station wagon by one person (photo) for rapid transport between test plots. The pump unit and hoses can be carried in the trunk of a sedan when spray tanks are available at the test site. The suction hose can be used to obtain stream or irrigation water to fill the tank when pipe water is not available at the test site.

A trigger-operated spray gun (Gunjet Spray, Model 43HA) was found worthwhile on all types of hand spray operations. With the use of various sized orifice discs and Tee-Jet nozzles, wide-to-narrow angle cone, straight jet or flat spray patterns could be directed to the item to be sprayed. This spray gun was particularly useful in spraying cattle in corrals for either backline application of insecticides

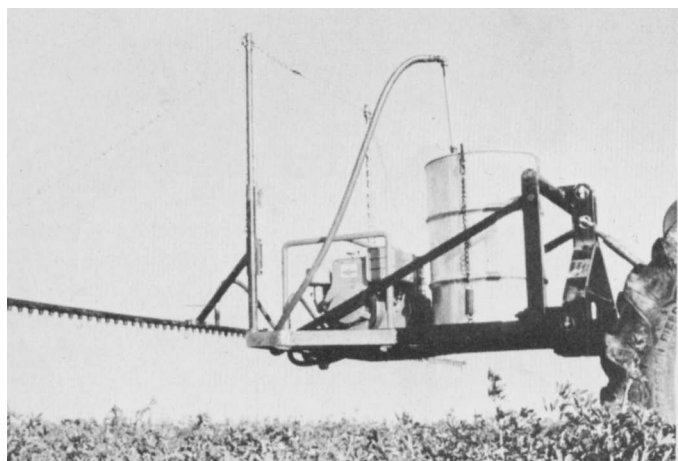
for horn fly or cattle grub control, or for tick or louse control when animals needed individual treatment at short distances (photo). It was also found that less spray material could be applied to test units, in a more accurate and easy manner, by using this gun rather than the more common orchard gun. The pump unit and small 30 gallon spray tank was easily carried on a battery-powered egg cart (photo) for applying larvicide to poultry droppings, or for similar spraying of poultry for fowl mite and lice control.

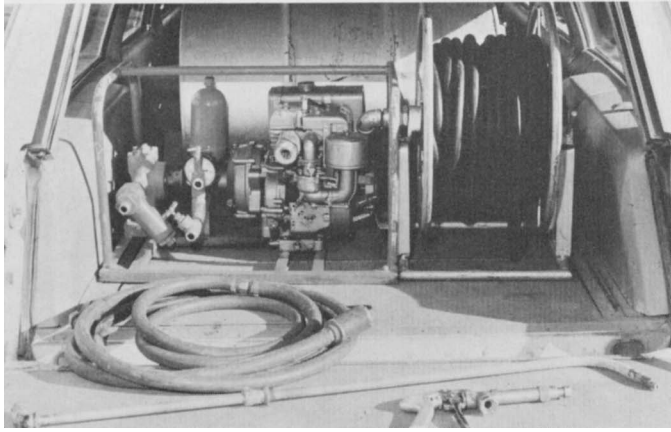
After two years of successfully using this pump unit for hand spraying it was decided to design and construct additional equipment adapting the pump unit for use as a quick-transport, all-purpose row crop sprayer.

The crop spray equipment (photo) consisted of a frame of 2½-inch angle iron with 48- and 31-inch rear and front width, and 48-inch sides. A three-point A-frame hitch was bolted to the front por-

tion of the frame so the unit could be quickly attached to any tractor with a three-point hitch. The one-piece frame and hitch unit (photo) is easily transported in a station wagon or pick-up truck. The frame supports a 30- or 50-gallon barrel supply tank and the pumping unit. The supply tank was fitted with an 8-inch hinged filler dome with locking lid. A ¾-inch single throw valve was fitted in the bottom for draining and cleaning. Tanks can be plastic lined to prevent rusting and chemical corrosion.

The removable boom was made in two 6-ft long sections with 28-inch extensions—allowing easy transport and providing a range of adjustments to fit different row spacings. The boom is hinged to swing to a vertical position to facilitate raising and





Spray equipment is easily loaded for transport in a station wagon or pick-up truck.



Spray equipment can be easily located close to a corral for complete coverage of livestock.

travel. Nozzle outlets were spaced at 2-inch intervals providing further quick, easy adjustment to a variety of crop row spacings and nozzle arrangement. Boom height is easily adjusted by use of the lift arms operated by the power take off (PTO) on the tractor or by use of the slide adjustment on the boom support pillars. A 160-lb pressure gauge was fixed on the boom to provide more accurate pressure readings, in addition to the 600-lb pressure gauge on the pump unit.

Spray flow from the pumping unit to the boom is controlled from the tractor by a single-pull, quick-shut-off valve. Two single-throw valves control the flow to each half of the boom.

Although this equipment was designed to be small and compact for easy transportation, the pump operates at high enough pressure (to 400 psi) to handle a variety of farm applications. The pump unit can be used on a variety of tank types and sizes, from trailer tanks or truck tanks

to assorted barrels. Also, fire fighting, white washing, high pressure equipment cleaning, orchard spraying, and herbicide treatments for weed control are a few of the possible uses for this versatile sprayer.

L. L. Dunning is Staff Research Associate, E. C. Loomis is Extension Parasitologist, and V. E. Burton is Extension Entomologist, University of California, Davis.

SUGAR BEET *yields increased by early planting, yellows-resistant varieties and aphid control*

F. J. HILLS • W. H. LANGE • J. KISHIYAMA

A combination of control measures to reduce damage from "yellows" disease of sugar beets has resulted in yield increases of 42 per cent in the overwintering area of central California. The yield increases were made possible through earlier planting with suppression of sugar beet yellows through the use of a resistant variety, and aphid control.

UNIVERSITY OF CALIFORNIA at Davis is the approximate center of an area that overwinters a large acreage of sugar beets for spring harvest, usually extending from March through May. Overwintering plays an important role in distributing the harvest for better use of sugar-processing facilities throughout the year, and has become an economically established practice during the last decade. Unfortunately, this results in the mainte-

nance of a large reservoir of plants infected by viruses that cause "yellows" disease of sugar beet. The green peach aphid, the principal known vector for these viruses, acquires viruses from infected plants during dispersal flights which usually occur in March and April, and carries them to young plants that are planted in April and earlier. Dispersal flights of the green peach aphid decline by June, and little of the virus is spread from plant to