

A MULTI-PURPOSE EXPERIMENTAL SPRAY UNIT

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Summary: An experimental spray unit, designed and developed to spray various plots with different chemicals and at various rates with minimal change-over time and without chemical contamination is described.

DESIGN AND COMPONENTS

The following components are mounted on a Toyota Landcruiser, four wheel drive vehicle with dropside tray. This unit is suitable for mounting on any appropriate spraying vehicle.

One 200 litre fibreglass tank with total bottom drainage.

One 20 litre and one 10 litre stainless steel chemical tank, each with an air agitation tube to near the base of the tank with total bottom drainage.

One 10 metre "Hardie" boom fitted with non-drip nozzle assemblies. The boom also has several 2-way taps fitted to cut the swath size. Four solenoids are fitted to drain the end of the various size boom options.

Compressed air source being either a small electric compressor or bottled compressed air.

Several 3-way and 2-way taps, to direct and control flow.

Solenoids to control flow of air and liquids.

A "Norgren" air pressure regulator for controlled air pressure.

One compressed air reservoir, approx. 50 litres.

One clock face scale 0-10 kg for water measurements.

See figure 1.

OPERATION OF THE SPRAYING UNIT

The 200 L fibreglass tank can be used as a water carrying vat or for large area spraying. There is a motorised pump unit with a bypass and agitation return hose to the fibreglass tank. The tank outlet is in the bottom for total drainage. A tee in the outlet line allows for either pump use or drainage through a tap on the side of the vehicle. A clock face scale can be attached to a bracket above the tap. A bucket hangs on the scale which is tared and water weighed off (1 litre = 1 kilo at 18°C).

Most sprays are applied through the stainless steel tanks. These tanks use air for agitation and pressure. Liquid filled gauges are set in the top of the tanks for accurate pressure readings. A "Norgren" in-line air regulator with locking ring is used to control the pressure in the tanks.

By using full bore 3-way ball valves the flow of spray solution can be directed from either the fibreglass tank or stainless steel tanks to the boom or hand lead or side delivery nozzle.

Solenoids are used to control flow of spray solution, compressed air and boom emptying and flushing. All solenoid operations are controlled from within the cab of the vehicle, thus no spray lines or taps are in the cab. All solenoids are fitted with "Viton" seals for chemical durability and non-contamination. All hoses are of a size large enough to cause minimal flow restrictions of either compressed air or spray solution.

The boom is a standard "Hardie" 10 metre boom spray with 13mm P.V.C. lines. 13mm full bore ball valves are fitted to allow combinations of 3,5,6,8, 10 metres. Four solenoids are arranged so as to allow priming, dumping and flushing of spray solutions in quick time with minimal contamination or wasted spray solution or compressed air.

All taps, gauges, solenoids, tanks etc. are below face level for safe handling and filling. All treatments are filled through a funnel with 100 micron mesh filter for minimal blockage problems.

PRACTICAL APPLICATION

This spraying unit design has been installed on several four wheel drive vehicles in the Western Australian Department of Agriculture for application of fungicides, insecticides and herbicides. These units offer good mobility on both road and in paddocks and are used for trial work throughout the agricultural areas.

Spraying of 10 herbicide treatments, replicated three times with plots 5m by 50m can be completed within 120 minutes. Changing from a 10m to 5m boom can be completed in 5 minutes including calibration.

The spray unit described has proved to be efficient, safe and reliable over the range of experimental and demonstration trials, in all situations, for which it has been used.

ACKNOWLEDGEMENT

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A Multipurpose Experimental Spray Vehicle

