



Protectant application equipment

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Grain protectants kill insects that come into contact with treated grain. They are available in both powdered and liquid forms.

For grain protectants to work they must be:

- applied at the correct rate, and
- mixed evenly with the grain.

**Poorly calibrated equipment
wastes chemical, time and money**

Powder Applicators

Powder applicators meter protectants onto grain in the hopper or casing of an auger.

All designs depend on turbulent grain movement through the auger to mix the grain and powder evenly. Auger length, diameter and speed affect the degree of mixing.

Liquid Applicators

Grain handlers who use liquid protectants usually spray it onto grain while augering into storage. The auger does most of the mixing.

Spray applicators can be built from off-the-shelf spray tanks, pumps, pressure regulating valves and gauges, spray lines and nozzles. Take care to select materials that suit chemicals used, especially seals and diaphragms.

Knapsack sprayers or gravity feed from drums (the 'drench drum method') are only for emergencies. They are difficult to calibrate and usually give very uneven application to grain.

Nozzle types and location

Figure 1 shows three possible nozzle locations to apply liquid protectants to grain:

- (a) hopper (inlet) - easy to see blockages; Moist grain may slow grain flow; spray may drift; operate at 150-300 kPa (20-45 psi);
- (b) casing - higher pressure assists distribution; no spray drift; nozzles not visible so pressure gauge or flow meter needed; mount 2 nozzles at bottom end of auger as shown in Fig 1(b); operate at 300-400 kPa (45-60 psi);
- (c) outlet - blockages easily seen; drift may be a problem; uniform mixing with grain is unlikely; operate at 150-300 kPa (20-45 psi).

Fan nozzles (low pressure, large droplets) are suited to external locations - inlet or outlet of auger. Hollow cones operate at high pressure and low volume to produce fine droplets - suited to spraying directly into the auger casing. Solid cone nozzles can be used in either location, but drift may be a problem in external positions.

Plastic spray tips are preferred because of their durability and cheapness.

Pumps

Liquid protectants are typically applied at one litre per tonne of grain. Pumps must be selected to accommodate the maximum application rate.

Allow sufficient pump capacity for bypass agitation if needed to keep protectants from settling. As a guide, select a pump with a rated capacity at least twice that required at the nozzles. Lower capacity pumps can be used with sprays that don't need agitation.

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Most common pumps can be adapted to apply protectants. They include gear, piston, turbine, diaphragm, roller and centrifugal. Small 12V diaphragm pumps are often used because they are compact, convenient to power, quiet and relatively cheap. Price, amount of use, power source, chemical types, maximum flow rates and pressure determine the best type of pump.

Take care with piston, gear and roller pumps - excessive wear may be a problem if wetttable powders or suspensions are used.

Calibration

Calibration simply involves adjusting grain and protectant flow rates until the correct application rate is reached. The following points are important when calibrating an auger:

- auger speed and angle alter throughput - higher angles lower the capacity;
- different grains flow at different rates.

Liquid applicators

Firstly, measure the time taken for your auger to deliver a known quantity of grain. Then calculate the amount of liquid protectant that is needed to treat this much grain.

Measure the amount of liquid that is actually being delivered over the same time and adjust the flow-rate until the correct rate is reached.

Liquid application rate can be altered by changing one or more of the following:

- nozzle aperture;
- pump delivery pressure;
- grain flow rate (speed or choke);
- dilution of spray concentrate.

When aiming to apply 1 litre/tonne of grain the following quick calculations will help:

- multiply ml/min at nozzles by 0.06 to give required auger throughput in t/hr;
- multiply t/hr at auger by 16.67 to give the required spray delivery in ml/min.

Powder applicators

Powder applicators often need to be calibrated by trial-and-error because the powder is usually difficult to collect. Manufacturers usually list approximate settings so use these as a starting point. Run and adjust the unit until the correct amount of powder is dispensed.

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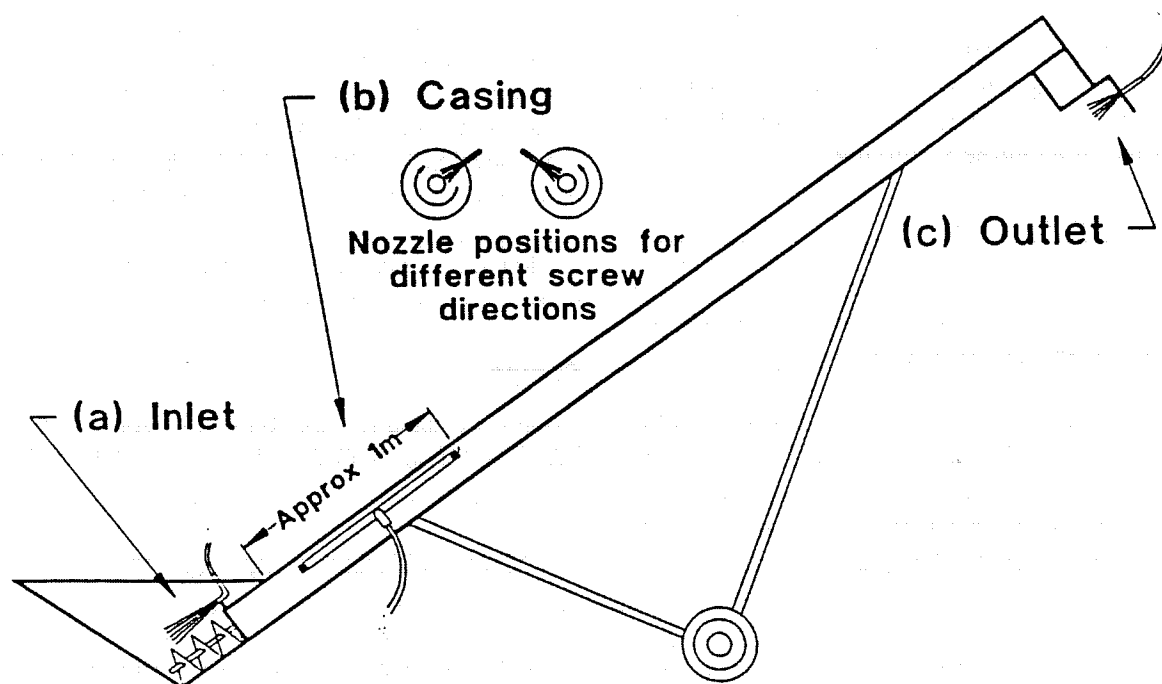


Figure 1 Alternative positions for liquid protectant spray nozzles

Table 1 Examples of commercially available protectant applicators (other suitable equipment may be available)

Equipment	Cost (July '92)	Comment	Manufacturer
POWDER APPLICATORS			
R.K. pickler - standard	\$485	Driven by auger flighting; mounts on hopper inlet or casing.	Loxton Engineering Works Pty Ltd Edward St, Loxton, S. Aust 5333 Phone 085-847609 Fax 085-846380
- casing	\$188		
Jachmann applicator	\$747	Fits over hopper; falling grain drives distributor.	Ron Jachmann Motor Engineer PO Box 203, Loxton, S.Aust 5333 Phone 085-872259
Dryacide applicator	\$475	Delivers Dryacide® or other powders to auger hopper; 12V	Dryacide Australia Pty Ltd PO Box 38, Scarborough W.Aust 6019 Ph (09) 459 9849 Fax (09) 493 2329
Bawsan seed treater	\$322	Rotary atomiser; 12V; max 15t/hr	Agchem Pty Ltd, Port Wakefield Rd, Parafield Gardens S.Aust 5017 Phone (08) 258 2233
LIQUID APPLICATORS			
Flojet 2000 seed treatment applicator	\$440	Twin nozzle spray system; 12 Volt.	Spraying Systems Australia Ltd 36 Edmonstone Rd Bowen Hills Q 4006 Phone 07-854 1677 Fax 07-852 2421
Normoyle grain insecticide sprayer kit	\$210	Direct spray; 12 volt	Normoyle Pty Ltd PO Box 437, Young NSW 2594 Phone 063-821499 Fax 063-821326
Model 540 liquid applicator	\$330	Direct spray, cam drive off auger shaft.	Australian Agricultural Machinery Group PMB No 2, Dubbo NSW 2830 Phone 068-823222 Fax 068-823641
PUMPS			
A wide range of pumps suitable for use in protectant applicator units is available.	variable	Consult local agricultural merchandisers or pump manufacturers	--

Operation

Constant grain flow is vital to ensure correct and even application of chemical. Always keep the auger choke fully covered and avoid dispensing chemical and powder into augers that are not full of grain. Machines connected to auger drive shafts will continue to deliver protectant even when the auger is running empty.

Ensure that the correct amount of protectant is used - lower than recommended rates can make application a waste of time. Accurate calibration is essential.

Cleaning

Thoroughly clean equipment after each use. Follow manufacturers directions, if supplied. Otherwise, flush spray systems with clean water mixed with ammonia or mild detergent.

Safety

Chemical protectants are dangerous, particularly in their concentrated form. Guidelines to safe use include:

- protect yourself - overalls, gloves, goggles;
- don't blow through blocked jets or tubing;
- avoid chemical dust and fumes;
- dispose of chemical containers responsibly;
- keep hands away from face and food; and
- re-calibrate before each use.

