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APPLICATION OF DRYACIDE DUST FOR THE STRUCTURAL TREATMENT OF GRAIN SILOS, BINS AND GRAIN STORES

The application of Dryacide dusts as a structural treatment of grain bins, storage facilities and grain-handling machinery has been recognised by the Grain Industry in Australia as being a beneficial industry development of significance. Being composed of an inert dust, it is residue-free and approved by Organic Growers Associations. Just as importantly, it kills insecticide-resistant species yet will not itself be subject to resistance development. It will also provide protection for 12 months and is very economical.

1. APPLICATION RATE

2 g/sq mt

2. APPLICATION METHOD

Dryacide dust requires a moving air stream to direct it onto the surface being treated. It CANNOT be simply thrown into silos by hand. Depending on the size of the silo or store to be treated, hand operated or powered equipment should be selected.

3. EQUIPMENT REQUIRED

3.1 On-farm silos and small bins or stores.

Bellows Duster

Hand operated equipment such as bellows dusters are quite suitable for these applications. A typical hand duster is illustrated.

3.2 Commercial Silos and Stores

Power Dusters can be either air or fan operated.
If compressed air is available, by far the most effective and economical equipment to use is a venturi blower. A proven unit is the BLOWVAC BV22 retailing for about $90 (Dryacide Australia).

Blovac Venturi Duster

The most appropriate fan-operated units are the "backpack" types powered by a patrol driven 2 stroke engines. Suitable units are the SILVAN IDEAL-Silvan Pumps & Sprayers and the SR 400 MISTER-Stihl Australia Pty Ltd. Both companies maintain branches in capital cities of all Australian States and the units retail for about $750 - 900, but can also be hired.

OPERATION

Calculate the amount of dust required (see Table below for typical examples), weigh out this quantity and fill the Applicator.

Vertical Silos

Apply from top loading points or roof vents. Start with the underside roof area being careful to maintain sufficient distance from the surface to avoid "blowing off" the dust coating. Vertical walls are then treated, rotating to treat the top levels then working down to the bottom level. Finally direct the dust stream to the floor area, avoiding the area close to the walls which will have already received sufficient dust from "fall-out" from the wall treatment.

If the silo is fitted with an aeration fan, (this should be encased to avoid dust getting into the motor), pour the pre-weighed quantity of Dryacide into the fan air-stream.

Horizontal Stores

Apply from top to bottom, starting with roof area, overhead trusses etc. It roof structures are more than 8 - 9 mt above ground level, it may be necessary to treat the roof surface from above ground walk-ways or from a mobile, elevated platform such as a fork lift truck. Always take care not to use too high a velocity, or apply from too close, otherwise the dust coating may be blown off rather than applied. Apply to floor surfaces last. The dust film is quite visible and the uniformity of coating can be monitored visually.

Machinery

Calculation of surface areas of machinery is not normally possible. For Augers, Elevators, Conveying belts, Ducts and other items of equipment which are to be treated, apply a steady dust stream into locations which should ensure all the internal surfaces are coated and continue until a dust stream emerges from the exit/discharge points of the equipment.

SAFETY

Although Dryacide is an inert dust, breathing in excessive amounts of any dust is not recommended. When exposed to the dust during application, wear a disposable dust mask and goggles.

TYPICAL QUANTITY REQUIREMENTS FOR VERTICAL SILOS

STORAGE CAPACITY		**DUST QUANTITY**
Tonnes	**Bushels**	**Kg**
20	720	0.12
56	2,000	0.25
112	4,000	0.42
224	8,000	0.60
450	16,000	1.0
900	32,000	1.7
1,800	64,000	2.6

APPLICATION OF DRYACIDE SLURRIES FOR THE STRUCTURAL TREATMENT OF GRAIN SILOS, BINS AND GRAIN STORES

The application of Dryacide slurry sprays as a structural treatment of grain bins and storage facilities is a recent development. The information developed from trials carried out during 1990/1995 is summarised below:

1. APPLICATION RATE

6 gm/sq metre (dry basis)

2. RECOMMENDED SLURRY COMPOSITION

10 - 20% v/v [one 15 kg bag in 135 litres water (10%) to 60 litres water (20%)]. The minimum slurry composition recommended is about 10% as this brings the spray to the run-off point on non-absorbent surfaces. The slurry should always be applied BELOW the run-off point.

3. APPLICATION PRESSURE

Low Pressure	40 to 60 psi
High Pressure	60 to 250 psi

4. EQUIPMENT REQUIRED

Slurry tank, Slurry plump with motor drive, Recirculation line, Discharge Hose, Wand extension with pressure gauge and trigger operated on/off valve, Slurry filter and Spray Nozzles. For High Pressure spray application, an additional, high pressure pump is required.

5. EQUIPMENT SPECIFICATIONS

a. Slurry Tank - 50 to 1,000 litre capacity fitted with a direct suction line from a bottom fitting to the pump and a recirculation line from the pump back into the top of the tank.

b. Slurry Pump - Centrifugal type generating at least 775-80 psi pressure. Impeller can be of plastic or cast iron fabrication. Clearance between impeller tips and pump housing should be 2 mm or more to avoid blockage by diatomite contaminants present in the product. Fire fighting pumps such as the Onga Model 350 perform very well. With the standard 5 hp petrol engine, this pump delivers 400 litres/min at 90 psi.

Positive displacement pumps such as gear or piston pumps cannot be used with the exception of diaphram types designed to handle slurries. For high pressure spraying, the high pressure pump is fed by the ;low pressure pump, both pumps having pressure relief valves venting back into the slurry tank. Spraying Systems Australia Pty Ltd can supply complete assemblies or the various components, as required.

c. Motor Drive. For most application rates an electrical or petrol driven motor of 3 - 5 hp should prove adequate.

d. Recirculation Line. An internal diameter of between 20-40mm (0.75 - 1.5 inch) is recommended. A valve should be inserted into this line to control the recirculation rate and discharge pressure.

e. Discharge Hose. An 12mm (0.5 inch) internal diameter hose has been used very satisfactorily over a number of trials. Use large diameter hoses (above 25mm 1") with caution as a lack of fluid turbulence in the line may lead to solid sedimentation and eventual blockage.

f. Wand and On/Off Valve. A 2 metre wand extension permits comfortable application onto wall and roof surfaces. The filter integrated into the trigger mechanism should be removed.

g. In-line Filter. This should be stainless steel, approx. 1000 micron aperture (1 mm or 16 mesh size) incorporated before the re-circulation union so that both directly sprayed product and recirculated material is filtered prior to entry into the spray line and nozzle. For typical commercial use, the filter should provide about 0.07 - 0.10 sq mt filter area.

h. Spray Nozzle. Flat, fan spray nozzles should be used. A minimum discharge capacity of about 5 litre/min is needed to avoid nozzle blockage. For side wall application, use a wide angle nozzle, 60 - 100 degrees, and for roof/top gangway spraying from the floor, a 15 degree cone nozzle provides good reach and dispersion. Typical nozzles used for low pressure application are.

Item	**Spray Nozzle**	
	AN10	**W6 Albuz**
Operating pressure psi	60	60
Slurry discharge rate, litres/min	8.3	10.7
Spray Angle, degrees	104	53
Most effective nozzle to wall distance, m	1.75	3
Effective spray width, m	4.5	3
Coverage rate for linear application rate of 1 m/sec, m^2/min	270	180

6. OPERATION

- Add the water to the Slurry tank.
- Start re-circulation with the valve fully open.
- Add the pre-weighed Dryacide and re-circulate for 1 or 2 minutes to give complete product dispersion.
- Partially close the re-circulation valve, start spraying then adjust the re-circulation valve to give a 40-60 (or 60 - 250) psi discharge pressure. Spray evenly to just below the run-off point, working from roof and upper wall surfaces down to lower walls then floor.
- When spraying is complete, empty out any remaining Dryacide slurry and replace with clean water. Continue spraying onto a waste area and re-circulating clean water for 2 to 3 minute to flush out and clean the pump, recirculation line, discharge hose, wand and nozzle. Empty, clean and re-install the slurry filter.

7. SETTING THE SPRAY APPLICATION RATE AND SLURRY COMPOSITION

- Mark out an area on a vertical surface.
- Spray the marked area, recording the time taken.
- Spray to wet only but BELOW the run-off point.

- Discharge the spray into a bucket for the same period of time and measure the quantity discharged.

8. EXAMPLE

- Measured area 4m x 25m = 100 sq mt.
- Time taken to spray 100 sp mt = 31 seconds.
- In 31 seconds, 4.2 litres slurry discharged into the bucket.
- Application rate required = 6 g/sq mt dry basis, (0.006 kg/sq mt).
- Slurry tank size = 200 litres.
- Slurry applied per sq mt = 4.2/100 = 0.042
- Dryacide required to be added to 200 litres water = 200 x 0.006/0.042 = 28.6 kg (This is a 12.5% w/w slurry).

NOTE: At a rate of 6 g/sq mt, the 200 litre quantity containing 28.6 kg Dryacide will coat 4,760 sq mt of surface. This corresponds to all surfaces, roof, walls and floor, of a horizontal storage facility measuring approximately 18m wide, 40m long and 6m high with a storage capacity of about 2,000 tonnes wheat).

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