

BETTER REPELLENT FOR DIRECT SEEDING

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A new, improved bird repellent without most of the defects of previous formulations used in direct seeding has been developed by researchers at Alexandria, La. Arasan 42-5, a liquid suspension of thiram (tetramethylthiuramdisulfide), is easy to apply and forms a durable coating that is free of noxious dust. It can be blended with Stauffer's Endrin 50W for protection from rodents and other seed-eating mammals, and it is as effective as the two chemicals previously recommended for field or nursery sowing, sublimed synthetic anthraquinone and Arasan 75.

The new repellent contains the same active ingredient- -thiram- -as Arasan 75, but it is formulated as a finely ground water suspension instead of a wettable powder. It contains 4 pounds of active material per gallon, and apparently the suspension can be stored indefinitely if it is not allowed to freeze. There is no dust during seed treating, and when it is properly applied the repellent mixture forms a relatively hard seedcoating that releases a minimum of dust after drying., It resists weathering better than coatings of the other two repellent materials, and it does not affect field germination of longleaf, slash, or loblolly pine seeds.

Field Evaluations

The first test of a liquid repellent was made in 1957, and that year the DuPont Company furnished experimental samples of the formulation that is now marketed as Arasan 42-S (fig. 1). The test was with longleaf seed. No sticker was used, and the first rain washed off the coating.

After laboratory trials showed that undiluted Dow Latex 512-R, added to the mixture at the rate of 5 fluid ounces per gallon, holds the thiram securely to the seedcoat, several more field tests were made with longleaf, slash, and loblolly pine. The results, summarized in table 1, show the liquid formulation to be equal or superior to anthraquinone and Arasan 75 for the three species tested.

During intensive field testing, several pilot-scale trials indicated that the new repellent has no serious limitations for sowing with hand-operated seeders, fixed-wing aircraft, or helicopters. Treated seed can be broadcast with a hand-operated seeder without discomfort to the operator, and personnel loading aircraft can work without protective clothing or respirators. Seed-flow characteristics through the various metering devices were equal or better than for seed treated with the other repellents. However, a light coating of aluminum powder is still recommended to facilitate uniform seed flow.

Seed-Treating Procedure

The liquid Arasan 42-S contains 42 percent solids, or 4 pounds of thiram per gallon. Application of 2 gallons per 100 pounds of seed (dry-weight basis) provides approximately the same amount of active repellent as the recommended 10 pounds of Arasan 75 per 100 pounds of seed. Generally, the small-seeded species require less repellent than longleaf, especially if the seeds have been stratified and are moist when treated. Small variations in the amount of repellent do not have important effects on field performance, provided all seeds are completely coated. The minimums for uniform coverage range from 1.5 to



Figure 1.--Longleaf seeds coated with Arasan 42-S are nearly white. The coating is hard and firm, and gives off practically no dust.

2.0 gallons per 100 pounds of seed--1.5 gallons for stratified seed of slash and loblolly pine, and 2.0 gallons for dry longleaf seed.

The liquid repellent has been very adaptable to large operations in which several thousand pounds of seed must be processed rapidly. With proper equipment, batches of 200 pounds can be treated, whereas for the dry repellent batches are usually limited to 50 pounds or less. Small lots also can be treated effectively.

Preparation of the liquid thiram-endrin mixture is the most difficult phase of seed treating. The main problem is working the dry endrin into a smooth mixture with the liquid without creating hazardous dust. The following procedure has proved efficient for preparing 6 gallons of an endrin-Arasan 42-S mixture.

1. Place 5 pounds of Stauffer's Endrin 50W in a clean 5-gallon container, add 2-1/2 gallons of Arasan 42-S, and stir with a paddle until the powder is so wet that no dust arises. Caution: Wear rubber gloves and a respirator, or work out-of-doors where inhalation of the endrin dust can be avoided. Destroy empty containers to prevent humans or animals from touching them.
2. Beat with a paint mixer operated with an electric drill (at least 1,200 r.p.m.) until the mixture is smooth and lump-free. This requires about 2 minutes.
3. Mix 750 cc. (25 fluid ounces) of undiluted Dow Latex 512-R with another 2-1/2 gallons of Arasan 42-S.
4. Blend the two mixtures by pouring from can to can 8 to 10 times.

TABLE 1.--Field germination and initial stocking per acre of old and new repellents¹

Repellent treatment	Species	1959		1962		1963	
		Field germination	Initial stocking	Field germination	Initial stocking	Field germination	Initial stocking
		<u>Percent</u>	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>	<u>Number</u>
Arasan 42-S.....	Longleaf	79	6,085	85	6,420	--	--
10-percent Arasan 75.....	do.	77	5,500	87	5,530	--	--
10-percent Arasan 75 + 1-percent Endrin 50W.....	do.	78	8,665	--	--	--	--
10-percent anthraquinone + 1-percent Endrin 50W.....	do.	81	5,805	--	--	--	--
Arasan 42-S + Endrin ²	do.	--	--	--	--	97	4,500
	Slash	--	--	85	5,140	94	3,440
	Loblolly	--	--	80	5,665	--	--
10-percent Arasan 75 + 2-percent Endrin 50W.....	Longleaf	--	--	--	--	92	2,860
	Slash	--	--	79	5,110	87	3,100
	Loblolly	--	--	77	4,640	--	--
Untreated check.....	Longleaf	83	111	92	0	85	0
	Slash	--	--	78	440	75	1,390
	Loblolly	--	--	84	640	--	--

¹ Initial stockings (for 1 month) were from 13,000 sound seeds per acre in 1959, 20,000 in 1962, and 15,000 in 1963.

² One pound Endrin 50W per gallon.

The final mixture will be a stable suspension, but if it is prepared several days before seed treating, it should be stirred thoroughly before use.

Coating all seeds uniformly with a minimum of a heavy liquid requires efficient mixing. Small concrete mixers are ideal. Those with a capacity of 3-1/4 cubic feet will treat up to 50 pounds of slash or loblolly pine seed per batch and 25 to 40 pounds of longleaf seed (fig. 2). For seed of 25 pounds or less, 2- to 5-pound lots can be mixed with a ladle in a small open container.

Lots treated first should be examined carefully to determine if enough repellent has been added to give complete and uniform coverage. The repellent mixture required is usually slightly more than one-half gallon per 25 pounds of seed. This rate can be varied slightly to adjust for variations in seed volume per unit of weight. Generally, the best procedure is to start with a slight excess; then gradually reduce the amount until the proper coating is produced. For small lots mixed with a ladle, about 3 fluid ounces of repellent mixture is required per pound of seed.

First, the seed is placed in the mixer, and a measured amount of the liquid repellent is added while the drum is turning. After 2 minutes of tumbling, powdered aluminum is added (at the rate of 16 tablespoons per 100 pounds of seed), and tumbling is continued for another minute. Stratified seeds can be treated moist, but it is better to remove surface moisture before treatment. Drying stratified seeds also reduces their tendency to cling to the inside wall of the mixing drum. Concrete mixers should be cleaned thoroughly before treating starts; the final step in the cleaning should be polishing with dry, sharp sand.



Figure 2.--Seeds of slash, longleaf, and loblolly pine coated with Arasan 42-S and exposed in the field for 6 weeks. Effective amounts of repellent coating remained after germination was complete.

Treated seed can be dried by spreading it 3 to 4 inches deep outdoors or on the floor of a well-ventilated building. Because the heavy liquid suspension adds a minimum of moisture to the seed, 3 to 4 hours of drying, with occasional stirring, is usually sufficient. The increase in weight after treating and drying averages about 11 percent for unstratified seed.

Cost

Arasan 42-S costs slightly more than Arasan 75 at equivalent rates of application. The cost of active thiram per pound of seed is approximately 15-1/2 cents when applied as Arasan 42-S at the 2-gallon rate, and about 13 cents per pound as Arasan 75 at a 10-percent rate. Costs of the latex adhesive and the endrin are the same with either product, averaging about 1 and 10 cents per pound of seed, respectively. Though Arasan 42-S costs slightly more, the treating procedure is simpler. Thus, it is doubtful if total costs, labor included, differ greatly for the two methods.