New Techniques in Seed Pelleting

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Processed Seeds, Inc., of Midland, Michigan, is a comparatively new concern whose business is based on the commercial production of pelleted or coated seeds for general agricultural use. Our work is based on a number of years of intensive experimental work which was started in the early spring of 1942. The original experimental work was carried on under the auspices of the Dow Chemical Co., which made application for patents covering major phases of the process in February of 1944.

For a period of five years extensive research was required in order to determine coating materials, sticker solutions, etc., which were most suitable for incasing various seed types, and which would allow for the free absorption of soil moisture so as to give unhampered germination of the seed. The study also included the possible use of various ingredients such as fungicides, insecticides, fertilizers and stimulants which could be used in the process that would aid in protecting the seed from rot under abnormal conditions, protect the seedling from pre-emergence or post-emergence damping off diseases, protection in the early stages of growth from soil insects, and to stimulate the plant to vigorous growth.

Our greatest success has been along these lines and we consider earlier plant maturity and increased production with disease control to be of far more importance than the mechanical advantage of proper spacing. In the middle west spacing means little unless a high rate of emeregence can be assured.

In 1946 Processed Seeds, Inc., was organized and given a license by the patent holding company for exclusive use of the process and its development. Research has continued on a large scale under the new company, and already five additional patent applications have been made covering improvements in the process.

Research at the present time which is showing promise as reported by cooperators is classified as follows: Insect control in the early seedling stage through the incorporation of insecticides such as dithane, chlordane, methoxychlor, chloranil, lindane, calomel, bichloride of mercury and others. Success has been reported in work on cabbage and onion maggot, corn root worm, and wire worm on beans.

Fungicide studies are being made on some of the antibiotics such as actidione. These studies are in the preliminary stage, but show some promise because of the very low concentrations required and the ease of application. The incorporation of pure innoculant cultures on legume seed prior to coating and the lasting effects of such treatments in storage of the pellets is a major project.

The use of herbicide-resistant materials such as activated carbon when placed in a layer about the seed to protect it from injury of soil treatments with weed killers such as 2,4-D is of value. Such treatments have shown

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promise where soil temperatures are sufficiently high to insure complete dispersion of the herbicide before germination takes place.

In the pelleting of range grass seeds for aerial seeding in semi-arid regions it is essential that the seeds be coated with materials which will not disintegrate when in contact with moisture on the soil surface. If the pellet disintegrates so as to expose the bare seed the seed will not get sufficient moisture for a long enough period of time to germinate. It is therefore essential to make a pellet which will merely absorb sufficient moisture to cause germination through the coat. This feature alone has been the main reason for many failures *in* aerial seeding projects. A stable pellet is almost the opposite of our past pelleting technique and it has taken some careful study to develop a pellet of the required properties and still not retard germination. Pelleting of other seeds for aerial seeding is being studied carefully and next spring we plan some extensive field testing with spring wheat and spinach sown from the air.

For the past several years we have worked with cooperators in the study of surface seeding conifer seed pellets in reforestation. Very few of these trials have been successful to date. We have not been able to find a rodent repellent which is effective in protecting the seed from many rodent species. Conifer seed is slow to germinate so must be protected for long periods. Heavy poisons in the pellet are not desirable but appear to be the only method of protecting seed pellets in infested areas. Another difficult feature of this program is that the new seedling is very slow to establish a root system and if dry weather comes on while the seedling is very young it stands little chance to survive.

The seedlings also require partial shade and direct sunlight tends to dry them up before they take hold. Field conditions which are suitable and meet these requirements are very hard to find.

In the past our program has been handicapped in not having a planter available which would do an accurate job of space planting even though uniform and spherical pelleted seeds were to be had. Only recently a mechanical planter has been ofTered which affords adequate spacing. Our efforts in this direction have been in developing a planting unit which selects the pellets from the seed container by magnetism. The pellets are treated with a small amount of powdered magnetite and are picked up individually by magnets inserted in a wheel which passes up through the seed can. This action gives a minimum amount of abrasive action and breakage, as well as giving a zero momentum drop of the pellets in the planting furrow. Other advantages of the machine arc simplicity of mechanism, low cost and ease of changing spacing on the ground. Also, adjustment will not be required when planting pellets of different sizes.

The use of pelleted sugar beet seed in the middle west has been increasing steadily. This increase has been a result of field performance and the request from growers for pelleted seed. This is the kind of growth we like to see and we prefer to have it come directly from the grower. In

Michigan, we still see a great deal of lack of uniformity in the planting of sugar beet pellets. Farmers plant all the way from 6 pounds of pellets per acre to 16 pounds. Where pellets are planted too thick the savings which could be effected both in seed and thinning labor are lost to some extent. We have inspected a great many fields and have noted that 7 or 8 pounds of pellets per acre give an adequate stand. The best field of beets I have ever seen in Michigan was planted with 6 pounds per acre. This is equivalent to 1 3/10 lbs. of bare decorticated seed.

In the middle west we are making a standard sugar beet pellet which contains 10% of the seed weight of regular arasan. This large amount of fungicide is required to give maximum emergence from the ground and to control seed rot under our usually wet and cold conditions. Fungicides to this extent are not required or recommended for use in warmer or dryer climates such as are encountered in the western areas. Under warmer conditions, which are more suitable to seed germination, 4 or 5% of arasan will give adequate protection. Faster emergence is also noted under these conditions. Arasan is the most expensive ingredient used in the pelleting process and an adjustment to meet actual needs will help to lower costs.