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N. J. Haggerty Jr.

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PACKAGING

Neil J. Haggerty, Jr. ^{1/}

The seed industry is in the midst of a packaging revolution. Many new types of containers are now being experimented with by your industry, and the promise of these new packages to your customers is amazing.

Recently, I received a letter from an agronomist in one of the southern agricultural colleges appealing to the packaging industry to assist them in determining the best means to package and store seeds to prevent, or at least minimize their loss of germination.

I would like to quote from this letter in order to emphasize the gravity of this germination problem throughout the world. "There is a very pressing and immediate need to come up with a better means of packaging seed for domestic and overseas shipments than those means presently in use. The International Cooperative Administration (ICA) annually buys from the U. S. large quantities of seed for shipment overseas to underdeveloped countries throughout the world. Although these seeds are of good quality when they leave this country, they are frequently deteriorated to the point of being non-usable for seed purposes upon arrival at their destination".

You gentlemen have probably encountered similar experiences with your seed shipments both domestically and for export. What causes the deterioration and loss of germination power in the seeds? What can we do to control or prevent this drop in reproduction powers?

Thanks to our university research people, such as Dr. Te May Ching, of Oregon State; Luther Jones, and Jim Harrington of the University of California at Davis, we have some idea of what causes these problems and we can now take

^{1/}Mr. Haggerty is Supervisor of Specialty Products, Multiwall Bag Sales Division, Crown Zellerbach Corporation, San Francisco, California.

action to control and minimize them.

These and other research people have devoted many years to learning how to store seed safely and economically. This information has gradually accumulated, and now we have a better understanding of the factors which govern the storage life of seed.

First is the nature of the seed itself. Each species has a different span of seed life.

The second big factor is moisture. High seed moisture and high relative humidity in storage facilities are detrimental to seed quality and germination but beneficial to growth of micro-organisms and insects.

A third factor is storage temperature. This is somewhat less important than moisture conditions.

A fourth factor is the length of storage. The longer the storage period, the lower the initial moisture content should be.

We can reduce these detrimental effects and in many cases eliminate them completely by drying the seed and maintaining this condition through the use of moistureproof containers and by controlling the temperature whenever possible.

I would like to discuss a few of the new containers and the protection they offer the seed in storage and transit. There are many types of shipping units that will transport your seed satisfactorily, but we are concerned with those that not only will carry your seed, but more important, protect their germination power and viability.

When designing a package to protect the germination power of your seed, it is important that it be tailor-made to fit (1) the type of seed (2) the cost of the seed (3) the effect of moisture upon the seed (4) the moisture content when packaged (5) the storage conditions (6) the length of storage and (7) the final destination.

When these facts are known - and only then - will your package supplier

be able to develop the correct package to fit your individual problems and applications.

What type of container will you need to handle your seed - a carrying unit, a moisture resistant unit, or a highly moisture resistant package?

First, let us discuss the various highly moisture resistant containers that are available:

1. Cans: The most efficient container for long storage available is the metal can. It is expensive and usually confined to smaller units of vegetable and flower seeds.

2. Foil bags: A new, efficient, and inexpensive container that is being developed to compete with cans. It is constructed from a 60# bleached kraft paper laminated to aluminum foil coated with polyethylene. It is flexible, easy to handle, and can be attractively printed. The foil bag has proven most efficient for the handling of hygroscopic products such as powdered milk and potatoes when any gain of moisture would be detrimental to the material. A moisture resistant closure is obtained by heat sealing the top on high speed equipment. As a seed container, it is still in its development stage and is being tested by Dr. Harrington under tropical, desert, and frigid conditions against the more expensive cans.

3. Corrugated cartons: The corrugated carton is another development in better handling, shipping, and merchandising of seed. This premium priced package was first used extensively last year to handle 10#, 25#, and 50# units of seed in California and the midwest. This new approach to seed packaging has altered the "status quo" in handling shipments of seed. Just how extensively corrugated will be adopted is hard to determine but it does have certain advantages in eye appeal, stackability, and it is helpful in marketing seed in retail outlets.

Most of the corrugated cartons in use today are not moisture-proof but this can easily be remedied through the use of a polyethylene free film liner. The moisture resistance of the poly liner will increase in direct proportion to the

thickness of the film.

4. Ten-mil polyethylene bag: The heavyweight polyethylene film industry is still in its infancy and many problems have yet to be solved before this container becomes economically practical. In its present state it deteriorates when placed in sunlight, requires special heat sealing equipment to close, and is difficult to extract the air left in the bag after filling.

It presents great future promise as a seed container. Each month new moisture resistant, less costly, and stronger films are being developed in packaging laboratories in the United States.

Polyethylene makes an excellent printing surface, has a very low moisture vapor transmission rate and equipment is being developed that will make it possible to fill and seal polyethylene bags at speeds comparable to paper or textile.

5. The foil laminated multiwall: This bag is constructed of four plies of multiwall kraft with an inner ply laminated with poly/foil/poly to provide you with the lowest vapor-transmission rate available in the bulk bag. Tests under tropical conditions indicate this construction is one of the best available in bags for maintaining the germination of seed in 25#, 50#, and 100# units for domestic and export shipment. The laminated foil multiwall can be handled on your conventional filling equipment. A heat seal closure is provided at the top with a heat seal tape machine which operates in conjunction with your sewing head. This bag can be filled, sewn, and heat seal tape can be applied in your plant with speeds up to fifteen bags per minute, or 900 bags per hour, if your scales are equipped to efficiently weigh at these speeds.

6. Multiwall-Polyethylene combinations: This container has proven one of the most effective and economical moisture barriers available that can readily be adapted to your present packaging operation. It is usually constructed of four plies of natural kraft paper with a three mil polyethylene liner placed inside the multiwall bag. The poly liner is tied or heat sealed, tucked in, and the paper plies

are sewn across the top with your standard sewing machines. Tests have shown that paper and free film combinations are more efficient and less expensive than the heavy, ten mil polyethylene bag. The paper plies as well as the dead air space between them, helps to reduce the diffusion pressure exerted by moisture vapor from penetrating the polyethylene liner and reaching your seed. This container provides an excellent printing surface, is strong, has customer acceptance, and can be filled and closed on your conventional equipment, and is ideal for exporting seed.

7. Sewn valve sleeve: This container is filled through the valve opening in one corner and incorporates a paper sleeve for closing. When filled, the sleeve can be quickly heat sealed or merely tucked in to provide a moisture tight and siftproof closure. Through the use of asphalt or polyethylene laminated paper inner plies, heat sealing the poly coated sleeve and applying poly coated tape over sewing on both ends, we have a highly moisture resistant package. By allowing your supplier to sew and heat seal both ends of the bag in his plant, it increases their strength and you eliminate the necessity of the seed processor's having to invest in sewing and heat sealing equipment for his plant. This container is used in conjunction with a valve packer machine that fills your bags and automatically shuts off at the weight selected with an over or under accuracy of one to two ounces. With this machine, it is possible for one man to fill up to 270 bags per hour on a single spout or over 450 bags on a double spout.

This labor saving, automatic filling and accurate weighing piece of equipment warrants your close scrutiny.

Carrying units: Our next major group of containers can be classified as carrying units. The metal or corrugated bulk bin, the corrugated carton, burlap, cotton, rayon, or paper bags fall in this category. These containers do not have the moisture protection offered by the other two major groups previously mentioned. In many cases where the seed is hearty and dry, and shipped into dry areas for

short storage, a burlap, cotton, rayon, or plain multiwall construction will be sufficient. Textile containers have the greatest strength, but seed in them is more susceptible to temperature change and moisture variation than in your paper constructions.

Moisture resistant containers: Tests indicate that many of the low priced, less moisture sensitive seeds can efficiently be handled in a moisture resistant container that protects germination power. Because of its low initial cost and merchandising appeal, this container should have wide acceptance in the handling of grass, field, and other low priced seeds.

Another group of popular moisture resistant containers is the cotton, rayon, or burlap bag laminated with polyethylene, asphalt, or with a separate free film poly liner. Although somewhat more expensive, they have excellent strength characteristics but when used alone do not have as high moisture resistant properties as the sewn valve or sewn open mouth multiwall bags. The sewn valve or sewn open mouth style bags would utilize an asphalt or poly coated paper barrier sheet (as the moisture-proof container mentioned before) but would not have the heat sealed valve or ends.

Our latest tests show that a 10#, (3/4 mil) poly coating on paper is more efficient than two sheets of 75# asphalt laminated paper as a moisture barrier. In addition, the polyethylene coating adds strength to your package and does not gum up your sewing machines. When using the sewn valve style bag, we merely tuck in the sleeve for a siftproof and moisture resistant closure.

In addition to the increased protection provided your seeds by these moisture resistant containers, they are also safe, protecting you and your customers when handling poison treated seeds.

There has been a recent trend by seed processors to print much of the seed identification information, warranties, and poison labels on the outside of their containers, eliminating the problem and expense of tags.

It is important that we use the right container for the right job. Surprisingly, the most popular shipping sacks are not the most economical. You will be pleased to know that the packaging industry can supply you with a moisture resistant, colorfully printed paper bag at prices quite competitive with burlap, and considerably below the cost of your present cotton and rayon.

We of the packaging industry are ready and anxious to assist you to meet and solve your shipping problems. We have worked with Oregon State College, the University of California, and with Mississippi State University, assisting in field tests, normal storage tests, and laboratory tests to develop these new containers to more efficiently and economically protect the germination power of your seeds.

When developing and designing these new containers, we are very conscious of your present investment in packaging equipment. We are equipped and trained to help you adapt these new packages if at all possible to your present filling, sewing, and handling equipment.

No one can be expected to utilize these new packages without help. Trained engineers and technical people are available to assist you in modifying your equipment and to train your employees to handle these new shipping containers. From past experience in other fields we have learned that these bags can be filled, sewn, and handled faster than your conventional container, thus reducing your labor and packaging costs. They can be of tremendous assistance to your sales department in merchandising your product by telling your quality story.

During your last few years, like many other industries, the seed business has been plagued with the problem of diminishing profits. We believe a 20% to 50% savings in new container costs, as well as your labor savings, can help improve your profit picture. This packaging revolution has been a step in the right direction by the seed industry and its momentum will be felt during 1960. The research by the seed processors, universities, and the packaging industry has developed these new containers to help you provide your customers with stronger seed.