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Management of Stored Grains with Aeration¹

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INTRODUCTION

Estimated annual grain loss from harvest to consumption is approximately 10 percent of total production. About half the loss occurs during harvest; the remainder, in storage. Grain loss can be reduced, and, in the case of storage, eliminated if proper storage procedures are followed. This publication discusses methods of using aeration to properly manage grain stores.

Aeration is a process of moving small volumes of air through grain or seed to cool and ventilate the material and maintain quality. The moisture content of the seed or grain is changed very little by aeration due to the low volume of air. Therefore, aeration should not be confused with *drying*, which reduces moisture to a level acceptable for safe storage or commercial sale. Drying can be rapid if heated air and high air flow rates are used, thus changing the moisture content considerably in a short period. So these two terms are used in referring to moisture control and preservation of grain and seed; the two should not be confused. For information concerning principles of grain drying, refer to Extension publication Circular 673, *Grain Drying and Storage on Florida Farms*.

Aeration conditions grain and seed by lowering the temperature of the material and equalizing the temperature within the storage structure. This prevents moisture migration and condensation.

All organisms responsible for losses in stored grain and seed are affected by the temperature and moisture of the material. Such organisms include bacteria, insects, molds and mites. Therefore, cool, dry grain and seed keep longer if these deteriorating conditions are prevented or retarded.

These organisms are greatly inhibited at temperatures below 40°F. Little insect reproduction occurs in grain below 60°F. It should be pointed out, however, that aeration is an aid to insect control, not a substitute for proper pest management. For additional information concerning grain pests, refer to Extension publication Circular 873, *Pest Management Strategies for Storing Grains in Florida*.

MOISTURE MOVEMENT IN METAL BINS

Moisture often condenses in the top of stored grain even if it was dry at time of storage and was stored in a weather-tight bin. Grain and seed are normally placed in bins in the fall of the year and lose heat as winter progresses. The material near the walls and surface cools faster than the material in the center. This temperature differential within the bin produces air currents, as shown in Figure 1.

The air near the bin walls cools, becomes denser and settles downward, producing a downward motion near the walls. The air in the center portion of the bin is heated, expands and becomes lighter, causing it to rise. The warmer air has greater moisture-holding capacity and, therefore, absorbs moisture from the grain near the center of the bin. As this warm, moist

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