Equilibrium Moisture Content and Safe Storage Guidelines for Soybeans

Soybeans must be stored at temperatures less than 10°C to reduce relative humidity in the bin and minimize spoilage.

SOYBEANS MUST BE stored at 13% seed moisture to avoid spoilage during storage. However, like other crops, stored soybeans reach equilibrium under whatever temperature and humidity conditions exist in the bin. The moisture content at which grain will settle if the air temperature and humidity remain constant for a length of time is referred to as the equilibrium moisture content (EMC).

Tables of EMC values have been calculated for most crops in order to predict the grain moisture content at various temperature–humidity conditions. Soybean farmers should take particular care to avoid exposing soybeans to high temperature and relative humidity (RH) conditions inside the bin. This is because the EMC reached under these conditions will result in biochemical changes that reduce the quality of the crop. To date, EMC's for soybeans produced and stored under typical Manitoba conditions have not been calculated.

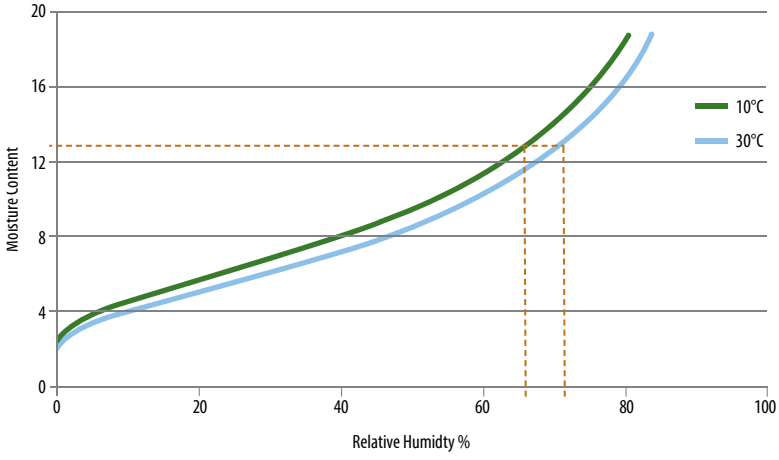
Three soybean varieties with a wide range in seed size were selected for this study. To encompass different post-harvest storage conditions, these varieties were either freshly harvested, subjected to three drying and wetting cycles or subjected to three freezing and thawing cycles. They were also subjected to six different temperatures ranging from 5°C to 30°C and five different RH values for a typical range in storage humidity.

This study produced EMC's that, once in table form, will help predict the final moisture content of soybeans exposed to air that is at a specific temperature and RH.

The results of this study have shown that it is critical to keep storage temperatures low (<10°C) for soybeans at any given seed moisture content. At higher temperatures, soybeans equilibrate with the air causing high RH inside the bin (Figure 1). Warm storage conditions in the bin could generate high moisture air pockets due to condensation, triggering mould growth. This highlights the importance of monitoring bin temperature and moisture conditions.

This research has provided a basic tool for predicting the safe storage guidelines of soybean varieties grown in a Manitoba environment. By storing soybeans correctly, farmers can maintain quality, prevent losses and ensure a marketable crop.

Figure 1. Comparison of the relative humidity of soybeans at 13% moisture content stored at 10°C and 30°C. Storage at high temperature results in higher relative humidity, which should be avoided to prevent soybeans from spoilage.



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