

AERATE: A PC Program for Predicting Aeration System Performance.

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Abstract—In the past our ability to predict aeration system performance has been limited. We could predict the effect of aeration on the seed condition and the rate of movement of temperature and moisture fronts through a seed bulk, but these techniques were *not* widely available to aeration system operators or designers. Recently, we have correlated the rate of growth of seed infesting insect populations against seed wet-bulb temperature. This has greatly enhanced our ability to understand the effect of aeration on insect population growth.

However, our ability to effectively use these tools has been limited because we have been unable to anticipate the *interactions* of the aeration controller and the controller's setting, with local weather conditions and with the seed properties.

Poor choice of controller setting can allow the aeration system to misleadingly *appear* to be doing its job of protecting the seed bulk when there are problems. For example, with temperature difference controllers, a controller setting that is too high allows very little aeration and so permits growth of insect populations, whereas a setting that is too low leads to over-aeration, high running costs and a possibility of wetting of the seed bulk and causing moulding.

Program **AERATE** addresses these problems¹. As the program:-

- allows ready estimation of the aeration cooling time for nine types of seed;
- incorporates the function of 5 types of aeration controllers; and
- uses weather data to predict *local* weather conditions at a seed store site;

it allows users to take into account of the interactions between the aeration system, seed type, controller setting, and local the weather conditions.

Program **AERATE** allows users to find the controller setting needed to cool the seed down to a "target" seed temperature for *controlling* insect populations, and the time needed for this cooling to occur. The program can also be used to assess an aeration system *design* to see how it is likely to perform at a particular location and time of year, or, under "worst case" conditions.

¹Program **AERATE** is available for purchase from SGRL.