



Amount of Diatomaceous Earth to add to Bird Feed to Prevent the Growth of Moths

By: Dan Vollmer, 6-24-18 Club Meeting Presentation

According to Timlick and Fields, bird seed should be treated with a minimum of 1000 ppm of diatomaceous earth (DE) to prevent the occurrence of moths growing in bird seed.¹ To convert ppm to percent by weight just divide ppm by 10,000. Therefore, 1000 ppm is equal to 0.1% by weight. If we choose to measure by weight we would add 0.1 lb. of DE to every 100 lb. of bird feed. Since many prefer to use volume instead of weight, the bulk density of DE was measured as shown below so that we can convert from weight to volume.

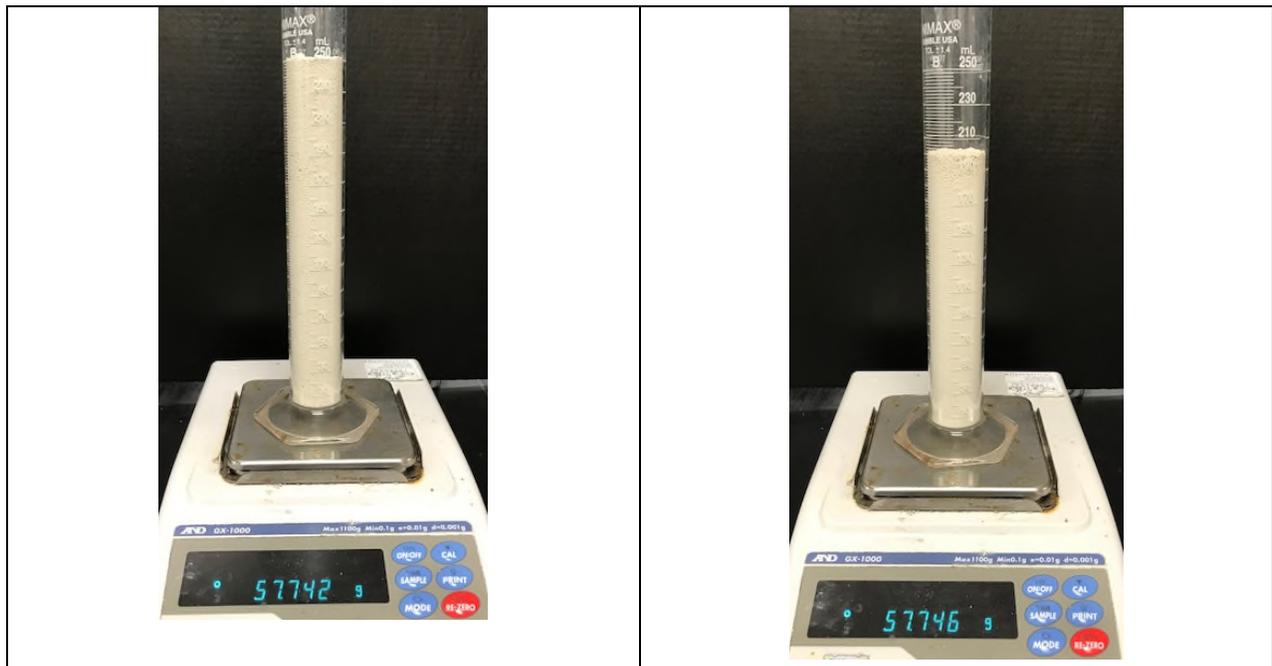


Figure 1: Determining the bulk density of DE

By not packing the DE, 250 ml of DE weighs 57.7 grams but if packed the same weight now occupies 200 ml. Here we use the not packed DE weight/volume to convert to volume measurements. To determine the bulk density, we divide the weight by volume. For this case $57.7 \text{ g}/250 \text{ ml}$ not packed = 0.231 g/ml which is the same as specific gravity. Now one tablespoon contains 14.7868 ml so applying some conversion factors ($14.7868 \text{ ml} \times 0.231 \text{ g/ml} \times 1 \text{ lb.}/453.6 \text{ g} =$



0.00753 lb/0.001 = 7.53 lb.) we find that 1 tablespoon can treat 7.53 lb. of bird feed or 1 teaspoon can treat 2.51 lb. of bird feed (3 teaspoons = 1 tablespoon).

Now applying the same procedure to bird feed we find that 1000 ml weighs about 635.4 grams or bulk density of 0.635 g/ml (see Figure 2 below). Since a convenient container to mix the DE and bird feed together is a 5 gallon bucket, if we fill the bucket half way (2.5 gallons) with bird feed the amount the bird feed will weight is about 6000 grams or 13.25 lb. Now the amount of DE to add will be a little less than 2 tablespoons (2.5 gallons x 3785 ml/gallon x 0.635g/ml x 1 lb./453.6 g x 1 tablespoon/7.53 lb. = 1.76 tablespoons) so adding 2 tablespoons of DE to 2.5 gallons of bird feed should be good enough. Note that the DE container warns not to add more than 2% by weight so 40 tablespoons would be too much.



Figure 2: Weighing 1000 ml of bird feed

Reference

1. B., Timlick, and P.G. Fields, "A comparison of the effect of two diatomaceous earth (DE) formulations on moths and the effect of different commodities on diatomaceous earth efficacy," 10th International Working Conference on Stored Product Protection, 2010, p. 840 – 844.