

**Carefully read the description of the experiment below. Be prepared to answer the questions that follow the design description as a class quiz.**

The effectiveness of (1) potassium bicarbonate, (2) neem oil, and (3) *Bacillus subtilis* were compared to the standard (4) organic lime sulfur/sulfur fungicide treatment for apples and an (5) unsprayed control for the prevention of apple scab and other fungal diseases. The trees used in the study were of the variety ‘Empire’ and were arranged at random in an experimental orchard at the University of Vermont Horticultural Research Center in South Burlington, VT. In 2007 five single trees were chosen at random to receive each of the five application types (25 trees in all). Trees were sprayed at the maximum label rates weekly from April to June and biweekly through July.



| Selected results from Table 1.                         |                |
|--|----------------|
| <b>Apple scab percent incidence on 'Empire' fruit.</b> |                |
| <b>Application type and rate/ha</b>                    | <b>Percent</b> |
| (5) non-sprayed  | 25.2 a         |
| (3) <i>Bacillus subtilis</i> 3.4 kg                    | 22.4 ab        |
| (2) neem oil 18.7 L                                    | 11.6 bc        |
| (1) potassium bicarbonate 4.2 kg                       | 11.2 bc        |
| (4) sulfur 16.8 kg + lime sulfur 18.7 L                | 0.4 c          |

Disease percent incidence and severity on cluster leaves, terminal leaves, and fruit were assessed on 10 clusters and 10 terminals per tree on 20-21 Jun, 10 terminals per tree on 22-24 Aug, and 50 fruit per tree at harvest (1-2 Oct). For our purpose the variable of interest is the percent incidence (i.e. occurrence) of apple scab on the 50 fruit sampled in October (see results from table 1).

The alternative fungicides showed some activity against foliar apple scab compared to the non-sprayed treatment and the potassium bicarbonate and neem oil treatments had significantly less fruit scab than the non-sprayed treatment. However, the lime sulfur/sulfur treatment provided the best overall control of scab.

|                 |                          |                                   |                            |
|-----------------|--------------------------|-----------------------------------|----------------------------|
| Answer choices: | <b>(A) an apple</b>      | <b>(B) application type</b>       | <b>(C) terminal leaves</b> |
|                 | <b>(D) an apple tree</b> | <b>(E) apple scab % incidence</b> | <b>(F) maximum rate</b>    |

Name \_\_\_\_\_ Quiz Number \_\_\_\_\_ Date \_\_\_\_\_ / \_\_\_\_\_ / 2012

Circle the appropriate letter for each question below.

- 1) What is the experimental unit for this experiment?      A    B    C    D    E    F    G
- 2) What is the sampling unit for this experiment?      A    B    C    D    E    F    G
- 3) What is the dependent variable for this experiment?      A    B    C    D    E    F    G
- 4) What is the treatment variable for this experiment?      A    B    C    D    E    F    G
- 5) If the design is RBD, what are the blocks?      A    B    C    D    E    F    G    NA
- 6) Does it seem more likely that the treatments are fixed or random?      (A) fixed      (B) random
- 7) What is the treatment arrangement for this experiment?      (A) single factor      (B) factorial      (C) nested
- 8) What is the experimental design for this experiment?      (A) CRD    (B) RBD    (C) LSD    (D) Split-plot    (E) Repeated measures
- 9) The degrees of freedom for testing treatment are \_\_\_\_\_ .
- 10) The degrees of freedom for the error used for testing treatments are \_\_\_\_\_ .