

Scientists Show Damaging Effects of Air Pollution

Was your sweet corn gasping for breath this year? Chances are it could have been, especially if you live along one of Lancaster County's heavily traveled highways.

Scientists have demonstrated in field experiments that ozone, a major component of air pollution, reduces yield in an agricultural crop.

Motor vehicle exhaust is the primary source of ozone. It is formed as sunlight reacts with the products of motor fuel combustion.

Previously, the deleterious effects of air pollutants have been mainly demonstrated and measured by visible injury to plants or by physiological responses of plants in the laboratory.

Now the proof is in—ozone reduces yield in sweet corn. Field studies on other crops are underway.

ARS plant pathologist Allen S. Heagle conducted the pollution study at Raleigh, N.C., in cooperation with mechanical engineer Denis E. Body and biologist Evelyn K. Pounds of the Environmental Protection Agency.

The scientists exposed Golden Midget and White Midget, both well-known sweet corn varieties, to charcoal-filtered air containing 0, 5, or 10 parts per

hundred million (pphm) of ozone for 6 hours each day from the time the corn emerged until harvesting. These doses of ozone are lower than those commonly found in many urban areas.

The corn was grown in 20 8-by-8-foot plots in field exposure chambers of clear plastic film.

Ozone caused more visible injury and greater reductions in growth and yield of Golden Midget than White Midget. This confirms many observations that some varieties of crop plants are more tolerant to pollutants than others.

In Golden Midget corn, the studies showed that the higher the ozone concentration, the greater the reductions in the number of ears with kernels, the amount of ear fill, and the number of kernels per ear and dry weight of the kernels. For example, the average number of kernels per ear in ozone-free air was 373, while in 10 pphm ozone the number was 228. The dry weight of kernels in 0 ozone averaged 43.6 grams, and averaged 23.8 grams in 10 pphm ozone. Moreover, there was leaf injury, the plants were somewhat shorter, and weighed less.

The major effects of ozone on White Midget occurred in yield associated with seed set. Ozone caused no leaf injury or decrease in plant size. This suggests that in

some varieties the physiological processes necessary for successful seed set are more sensitive to ozone than other plant growth processes. The number of kernels per ear in White Midget averaged 285 in ozone-free air and 197 in air containing 10 pphm ozone. The dry weight of kernels averaged 24 grams in ozone-free air and 16 grams in air containing 10 pphm ozone.

Because the ozone levels used in this study were lower than the levels commonly found in many large urban areas, the results suggest that yield loss in corn due to air pollution may be greater than previously realized.

Currently, air pollutants of most concern to vegetation include ozone, PAN (peroxyacetyl nitrate), sulfur dioxide, and fluoride. In this country, ozone is the major pollutant affecting plants.

ABPE Poses Serious Cattle Feeder Threat

Cattle feeders should be alert for a serious cattle disease problem resembling emphysema in humans. Called acute bovine pulmonary emphysema (ABPE), it's a disease that can be mistaken for several other problems, including weed poisoning. In some areas it has been acute this year because of unusually high moisture.

ABPE can develop rapidly following a change in diet. Moving livestock from one pasture to another is a likely time for it to occur. Though the disease is more prevalent in lactating cows, feedlot cattle are not immune. All breeds, both sexes and all ages of cattle can contact the disease.

Cattle with ABPE have difficulty breathing. In many cases they will stand with the neck extended and show respiratory difficulty with open mouth breathing. They may also grunt in an effort to exhale.

Cattle Do Well on Drought-Damaged Corn

In a University of Nebraska test, beef calves and lightweight yearlings fed silage from drought corn had similar average daily gains and feed conversions as cattle fed normal silage. Researchers warn, however, against labeling silage from drought-damaged crops as equal to normal silage without accurate dry matter deterioration.

Drought silage is not only low in yield per acre, but also is usually low in dry matter con-

tent. In addition, it may also be light in dry matter content for its bulk because of low grain content and loose pack.

Another consideration: Though drought-damaged silage may be equal in feed value to normal silage per ton of dry matter, the cost of harvesting will usually be higher because the yield per acre is reduced. Thus an adjustment must be made in harvesting costs to determine the value of dry matter standing in the field.

GIRTON

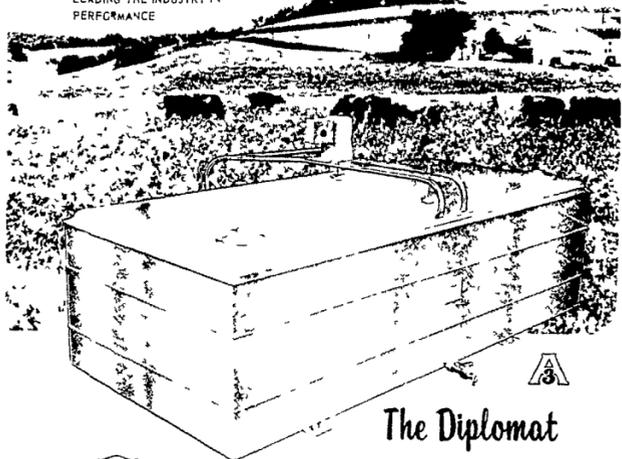
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