ANTIBIOTICS CAN REDUCE CHERRY STOCK CROWN GALL

Bacterial crown gall annually causes large losses of apple, cherry, rose, and other nursery stock. It is not possible at present to control crown gall completely, but certain practices help reduce the number of diseased plants.

One such practice is the treatment of root-pruned plants so crown-gall bacteria contacting the wounded roots will be killed. This is particularly important because crown-gall bacteria can enter the root and bring about infection only at a wound site. In the past, Semesan Bel, Ceresan, and mercuric chloride have been used for this purpose. These materials have been fairly effective, but have certain undesirable qualities such as toxicity to humans and to treated plants.

Several years ago a program was set up at Oregon State College to find chemicals effective in preventing crown gall. At that time antibiotics had only recently been made available for use in agriculture. Since no other chemicals with equal bactericidal value were available, three antibiotics were tested. These were streptomycin, Terramycin, and Agri-mycin (a mixture of streptomycin and Terramycin).

Cherries heavily damaged

Although crown gall attacks many plants, in Oregon nurseries it is most serious on cherry root stocks. For this reason mazzard cherry seedlings were used in the trials. In the experiments, mazzard cherry seedlings were root-pruned and inoculated by dipping the roots in a suspension containing crown-gall bacteria. Root-dip treatments with antibiotics were made to kill the bacteria on the roots and the seedlings were then planted. One hundred seedlings were used for each treatment and a standard Semesan Bel treatment was made for a comparison with the antibiotic treatments. After six months the trees were dug and examined for galls.

The bacteria-killing mechanism of antibiotics makes it necessary for the antibiotic to be in contact with the bacterium for a period of time before death occurs. Therefore, duration of the root dip is an important consideration, and treatments were made using various periods of dipping time as well as various dosages. Only a one-minute treatment was made with Semesan Bel since such treatment is enough to kill bacteria and longer treatments may be toxic to cherry stock.
**Terramycin most effective**

Comparisons of Semesan Bel treatment with one-hour treatments in 400 parts per million of streptomycin, Agrimycin, or Terramycin are shown in Graph 1. Streptomycin was about as effective as Semesan Bel, Agri-mycin somewhat more effective, and Terramycin much more effective. At all dosage levels and treatment periods tested, Terramycin was much more effective than either streptomycin or Agri-mycin.

The most effective Terramycin treatments not toxic to cherry trees in these trials were 400 ppm for fifteen minutes or 200 ppm for one hour. To allow an adequate margin for safety the treatment recommended for grower usage at this time is 200 ppm for thirty minutes. Further trials are being carried out to determine the most effective, completely safe treatment. It should be noted that a treatment giving no damage under one set of conditions may be damaging under other conditions.

**Gall increase noted**

Another discovery made during these trials was that incidence of crown gall can be increased by using root dips with fungicidal but nonbactericidal chemicals. The degree of gall increase has generally been very striking, with the percentage frequently doubled following such a treatment. Graph 2 shows a representative series of data.

![Graph 1: Relative Effectiveness of Four Chemicals in Preventing Crown Gall on Mazzard Cherry](image1)

![Graph 2: Increase in Crown Gall on Mazzard Cherry Following treatment with an Organic Fungicide](image2)
In these trials only dichlone and captan were shown to bring about this effect, but it is believed that other fungicides not active against bacteria would behave in the same manner. Dichlone treatments are made to control black mold and are excellent for that purpose; but when it is necessary to use such fungicides on mazzard cherry it is most advisable to also use an antibiotic to prevent crown gall. The antibiotic treatment should immediately follow the fungicide dip.