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The Effect of Ethephon on Stem Diameter and Vascular Bundles of *Hedera glacier.*

Eric Christian Reichert

ABSTRACT

Ethephon (2-chloroethylphosphonic acid), an ethylene-producing compound, was tested on 3 different *Hedera glacier* potted groups at 1ppt, 5ppt, and 10ppt. Ethephon has been shown to: increase dry and fresh weight, control elongation, increase crude protein content, advance maturity, and increase stem diameter (SD). An increase in stem diameter would allow the plants to be robust. Vascular bundles play the key support for plants; therefore an increase vascular bundle thickness (VBT) will lead to even stronger plants. Ethephon showed an increase in the ratio VBT/SD, increasing from a ratio of .173 for the control to .216 for the 10ppt group.

Keywords: *ethephon, vascular bundle thickness (VBT), stem diameter (SD), and int*ernode.

INTRODUCTION

Plant hormones are important for a variety of reasons, in my topic stronger plants. Herbicides are the most common plant hormones in use today, they are used to kill the plants basically by making them grow too fast. Today other types of hormones are being found to increase fruit production, stem strength or height, or simply to produce certain molecules for medical reasons. This topic of hormone control is important for agricultural food production. A treatment of peach trees with a 200ppm sol of ethephone was found to improve peach physiochemical characters, and advance their maturity (Muthoo and Chetan, 1997). Ethephone can also be used to control the elongation of the last internode of cut tulips by preventing growth of the internode but not affecting the plant's life (Suh and Lee 1997). When ethephone was treated on the stem, this prohibited elongation of the stem, which radially expanded giving a thicker stem (Salisbury and Ross 1992).

Another use for ethephone is to increase the winter activity in *Setaria anceps*. This was done by using ethephone, along with other chemicals like gibberellic acid, mefluidide, and simazin which in turn increased overall protein contents compared to the control group (Carrer et al., 1997). Ethephone was also used on bermudagrass, which showed a 22% reduction in plant height and both node and bud swelling (Shatters, 1998).

Ethephon has shown that it will advance maturity in plants. As above Muthoo and Chetan found that ethephon improved fruit yield and quality. A 118% and 110% increase in leaf and stem fresh and dry weights by using ethephon (Shatters, 1998). With this advance in maturity and an increase in mass, but a decrease in plant height, this leaves, radial expansion in the stem and/or leaves.

My search of this topic has overall shown that ethephone will increase stem diameter. this could force an increase in the vascular bundle size. Because the vascular bundles are the basic support, this can lead to stronger plants. In the research that used ethephon, it has been used on either monocots or fruit bearing trees. Although I am using *Hedera glacier*, a dicot, I hypothesize that ethephone will have a similar effect.

MATERIALS AND METHODS

4 groups, 1 control and 3 test groups was used that have 1ppt, 5ppt 10ppt respectively. The solutions were added 2 days after soil saturation of water to allow for proper concentrations in the soil. The plants were removed by cutting them 1cm from the soil surface by use of razor blade and then studied 24 hours after application of solutions. The plants will be given light throughout this period, using Sodium Lamps and will be at room temperature. *Hedera glacier* will be studied by making a thin slice of the stem. These slices will be made by use of a razor blade. Each stem will have 4 slices tested one in each of the first four internodes. A microscope will be used to measure stem diameter and vascular bundle thickness.

RESULTS

As stem length increased VBT increased also, so ratios were used for the reason of unequal length of stem. Five stems were tested and the ratio of VBT/SD gave the results, .173 for Control, .169 for 1ppt, .202 for 5ppt, and .216 for 10ppt. Figure A: shows an increase of the ratio by 80% while in Figure B the standard deviation decreased 77.37% from .0207 to .0160.

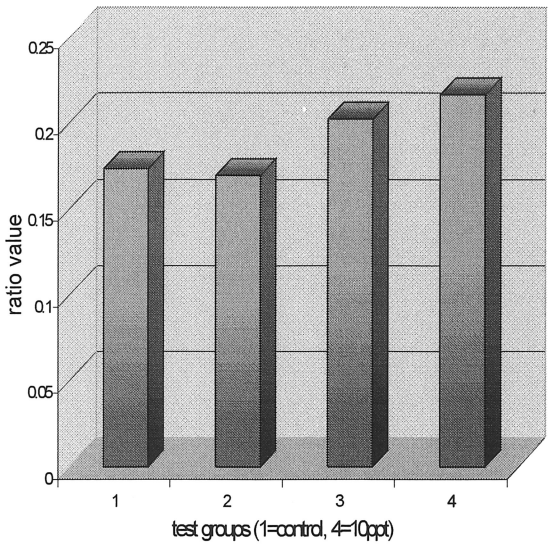

Figure 1. Average ratio of vascular bundle thickness to stem diameter.

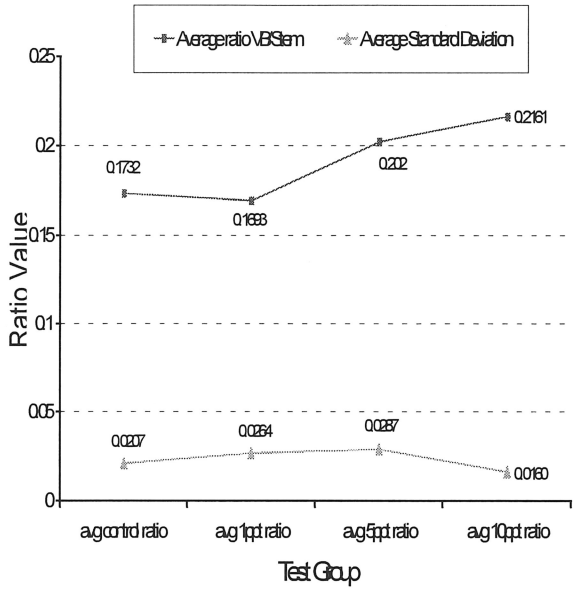

Figure 2. Average ratio compared to standard deviation.

DISCUSSION

The increase in the ratio means as I increased ethephon treatment VBT decrease, SD increase, or a combination of both. The standard deviation did rise as concentrations increased giving fluctuating results. Because of the chemistry of vascular bundles (fibrous cells), my conclusion is that the surrounding tissue expanded. This would mean in essence a stronger plant, although exactly what happened is not fully understood.

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