

## THE TOXICITY OF OZONE TO BLACK WIDOW SPIDERS

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Black widow spiders, *Lactrodectus hesperus* Chamberlin & Ivie, are sometimes found in packed table grapes. Their presence is of concern to local and foreign markets, particularly in Europe and the United Kingdom. We conducted experiments to determine the dose-response of the adult stage of the spider to ozone gas. Tests were conducted at  $3\pm 1^\circ\text{C}$  for a one (1) hour exposure under  $-10''$  Hg vacuum and either with or without the addition of 10% carbon dioxide.

Test spiders were obtained by collecting specimens from the field at night. In the laboratory the following morning, the spiders were placed individually into 7-dram plastic vials with snap cap lids. Several 1 mm holes had been drilled in both the lid and bottom of the vial to allow the free exchange of air and test gases. The spiders were fed moth larvae. Tests were conducted with the spiders within one to two days of being collected. Prior to the test, the spiders were preconditioned overnight at  $4\pm 1^\circ\text{C}$ .

Preliminary tests indicated that the adult stage was more tolerant to ozone gasification than immature stages and possibly that the ozone treatment might be more effective against the spiders without the addition of carbon dioxide. Therefore, we conducted tests exposing adult black widows to a wide range of concentrations of ozone gas either in combination with 10% carbon dioxide or not. All tests conducted to date have been at  $3\pm 1^\circ\text{C}$ . We plan to conduct a similar series of tests at  $29\pm 1^\circ\text{C}$  at a later date for comparison to efficacy data at the cooler temperature. Time of exposure will also be investigated and determination of equivalency of CxT product once an effective treatment is established.

Data showed ozone gas alone to be somewhat more effective against the spiders compared to ozone gas in combination with 10% carbon dioxide. Complete control of the spiders was obtained at a dose of 12000 ppm of ozone for 1 hour with or without carbon dioxide.

Response (mortality) of adult black widows exposed to ozone gas for 1 hour at  $3^\circ\text{C}$  and  $-10''$  Hg

Ozone gas concentration (ppm)	In combination with 0.1% (atmospheric) CO <sub>2</sub>	In combination with 10% CO <sub>2</sub>
500	12.5 ± 12.6	---
800	25.0 ± 10.0	22.0 ± 12.6
1250	47.5 ± 12.6	32.5 ± 32.1
2000	62.5 ± 12.6	44.0 ± 22.3
3000	80.0 ± 11.5	70.0 ± 8.9
5000	87.5 ± 5.0	82.0 ± 17.6
8000	95.0 ± 5.8	90.0 ± 8.4
12000	100 ± 0	100 ± 0
Total number observed (1 to 5 replications per dose)	320	290