

# Management of tomato bacterial spot in the field by foliar applications of bacteriophages and SAR inducers

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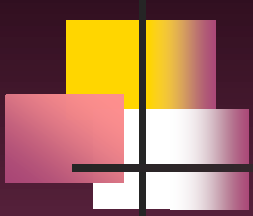
UNIVERSITY OF  
FLORIDA

Institute of Food and Agricultural Sciences

**Fall, 2001**

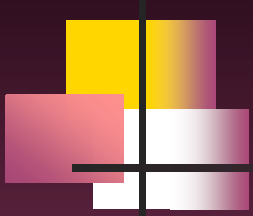
**North Florida Research and Education Center,  
Quincy, Florida**

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Tomato cv. BHN 555, complete randomized block design, 10 treatments with 4 replications.

- ❖ Copper hydroxide + Mancozeb (0.36% Kocide 2000 + 0.25% Pencozeb 75DF), weekly;
- ❖ Harpin protein (0.06%, Messenger, Eden Bioscience), two-week intervals;
- ❖ Acibenzolar-*S*-methyl (0.006 %, ASM, Actigard 50WG, Syngenta, Inc.), six applications per season, two-week intervals;
- ❖ Bacteriophage (1%, AgriPhi, Inc.), formulated with casecrete, PCF and sucrose, applied twice a week at dusk.

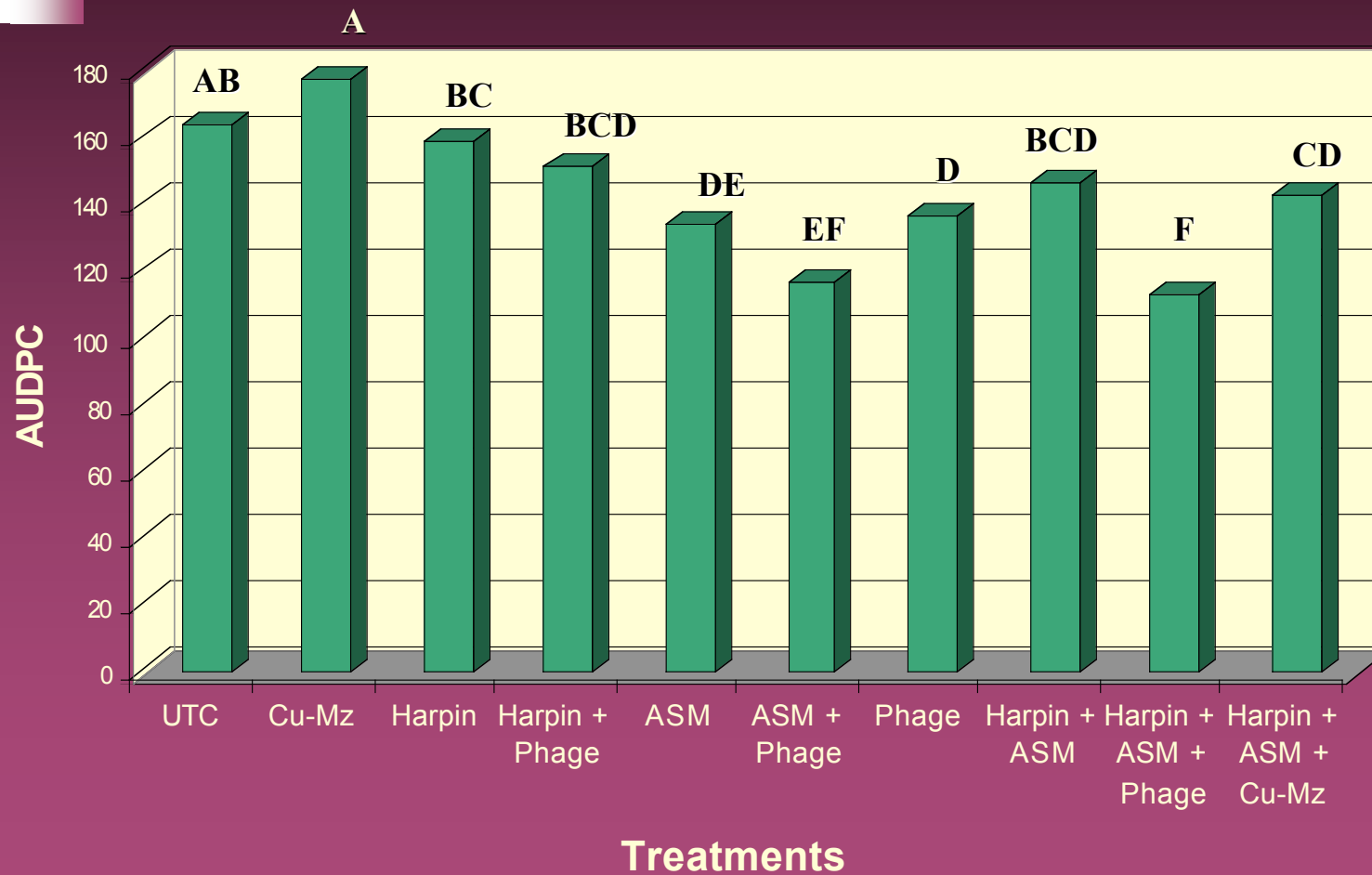


## Fall, 2001: Treatments

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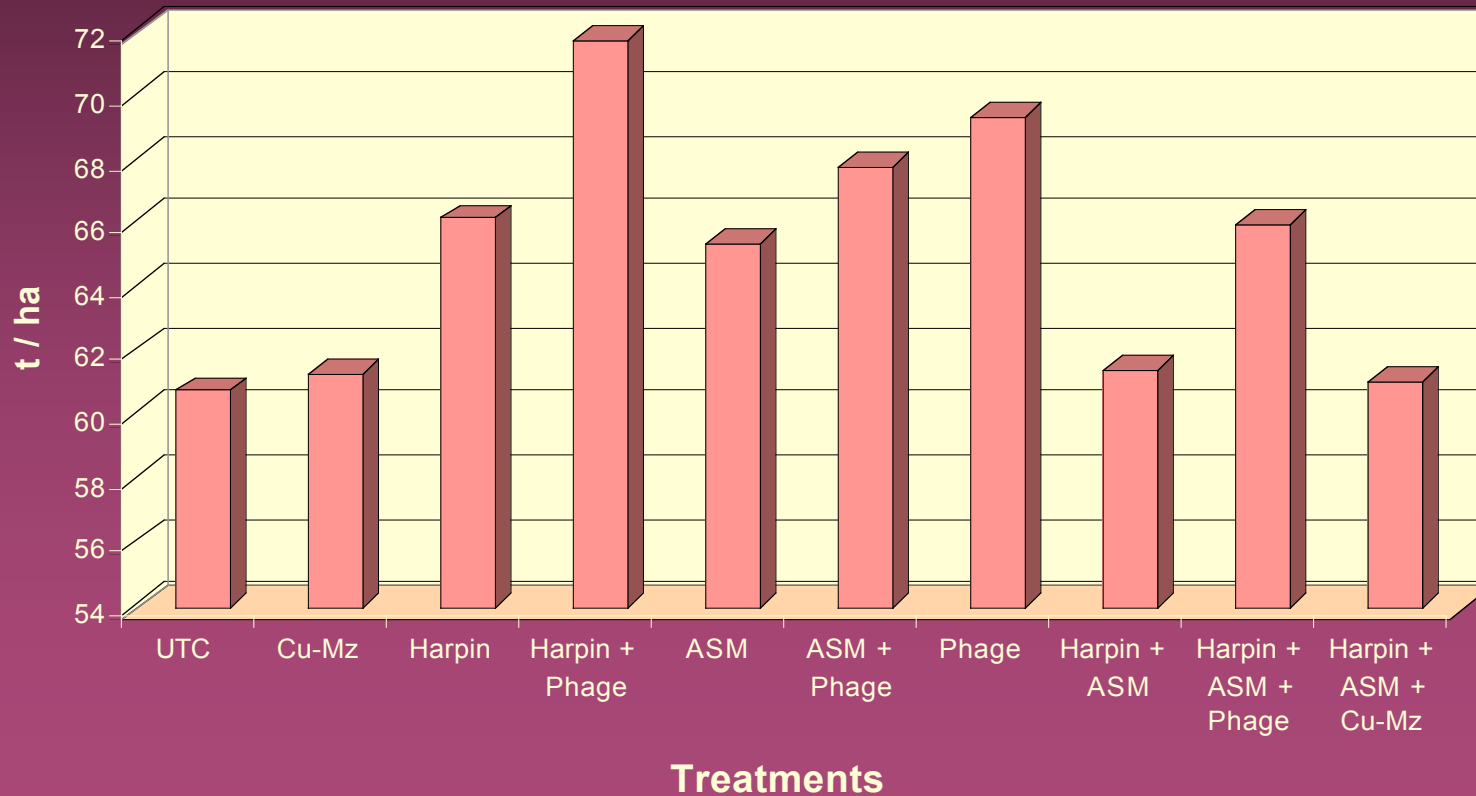
1. Untreated control (UTC)
2. Kocide + Pencozeb
3. Messenger
4. Messenger, Bacteriophage
5. Actigard
6. Actigard, Bacteriophage
7. Bacteriophage
8. Messenger, Actigard
9. Messenger, Actigard, Bacteriophage
10. Messenger, Actigard, Kocide + Pencozeb

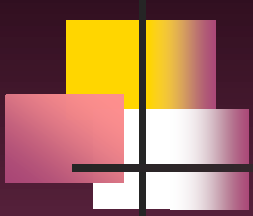
# Fall, 2001: Bacterial spot severity as area under disease progress curves (AUDPC)



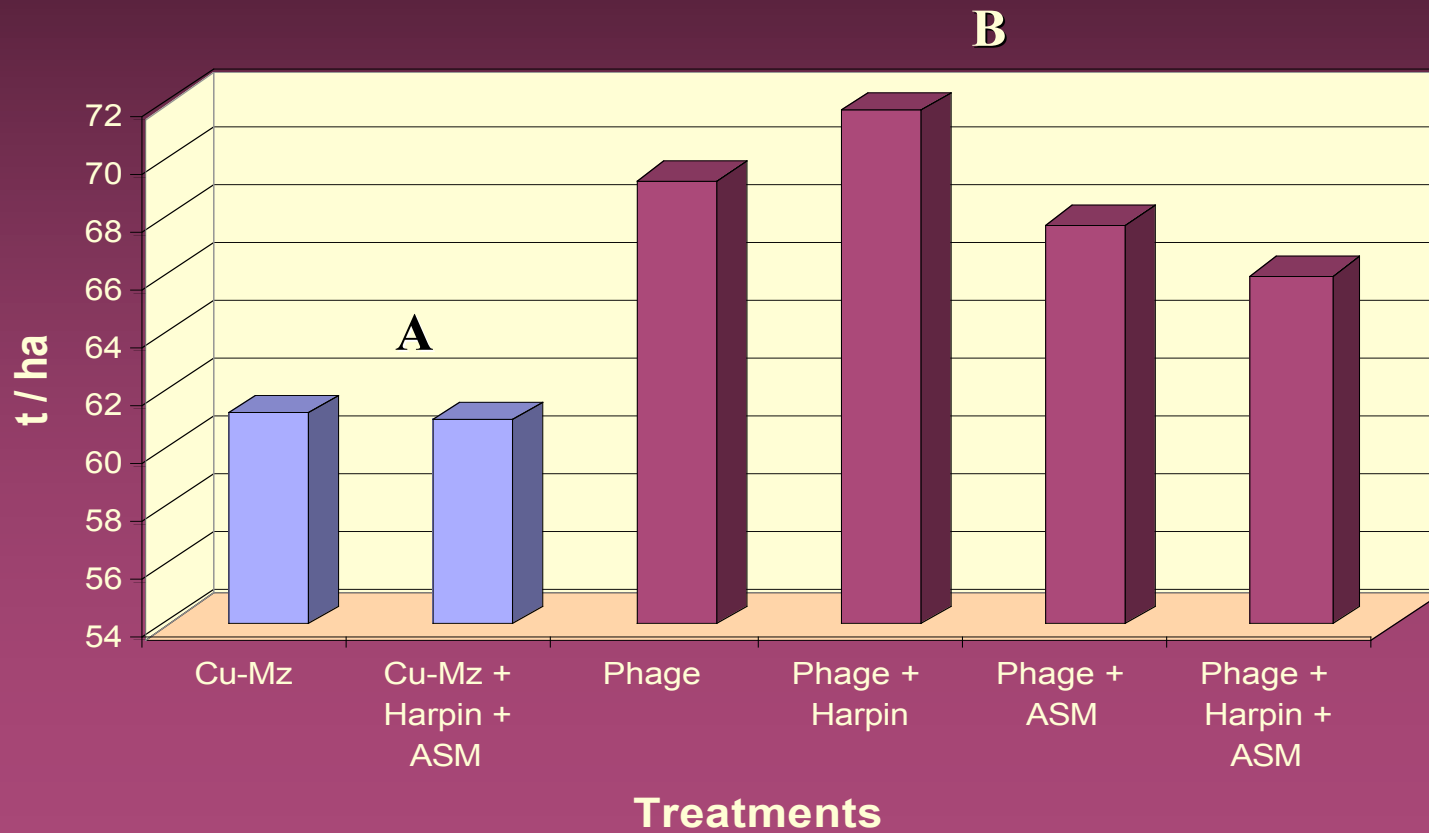
# Fall, 2001: Effect of investigated treatments on total tomato marketable fruit yield

No statistical difference

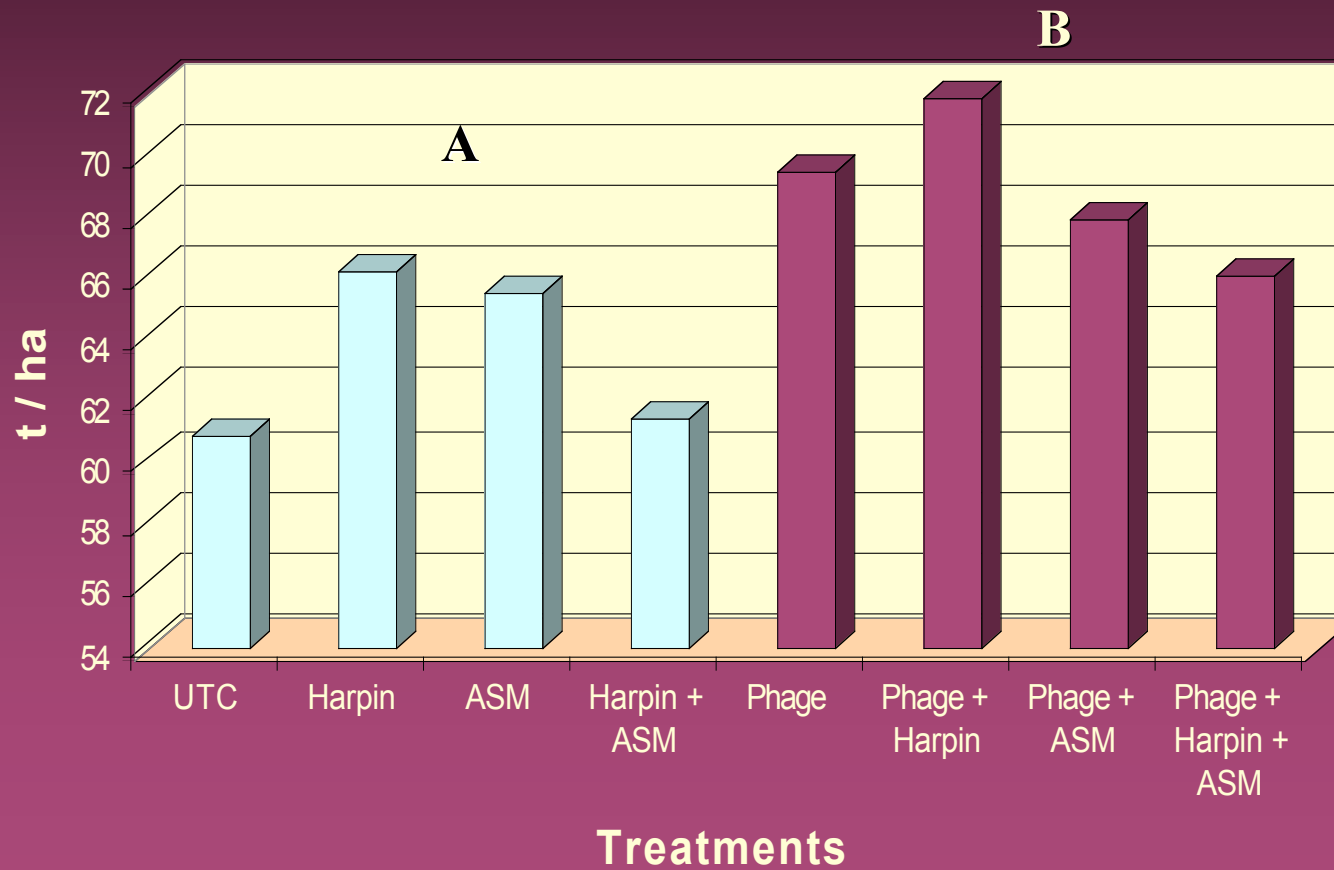




# Contrast analysis of total marketable fruit yield: “Cu-Mz” vs. “Phage” treatments



# Contrast analysis of total marketable fruit yield: “NoPhage” vs. “Phage” treatments





**Spring, 2002**

**Plant Science Research and Education Unit,  
Citra, Florida**

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- Tomato cv. BHN 444, split plot design, 12 treatments (6 nophage + 6 phage) with 4 replications, 45m plot distance.
- ❖ Copper hydroxide + Mancozeb (0.36% Kocide 2000 + 0.25% Pencozeb 75DF), weekly;
  - ❖ Acibenzolar-S-methyl (0.006 %, ASM, Actigard 50WG, Syngenta, Inc.), six applications per season, two-week intervals;
  - ❖ Harpin protein (0.06%, Messenger, Eden Bioscience), two-week intervals;
  - ❖ *Pseudomonas syringae* Cit7 ( $10^8$  CFU/ml), weekly;
  - ❖ Bacteriophage (1%, AgriPhi, Inc.), formulated with skim milk and sucrose, applied twice a week at dusk.

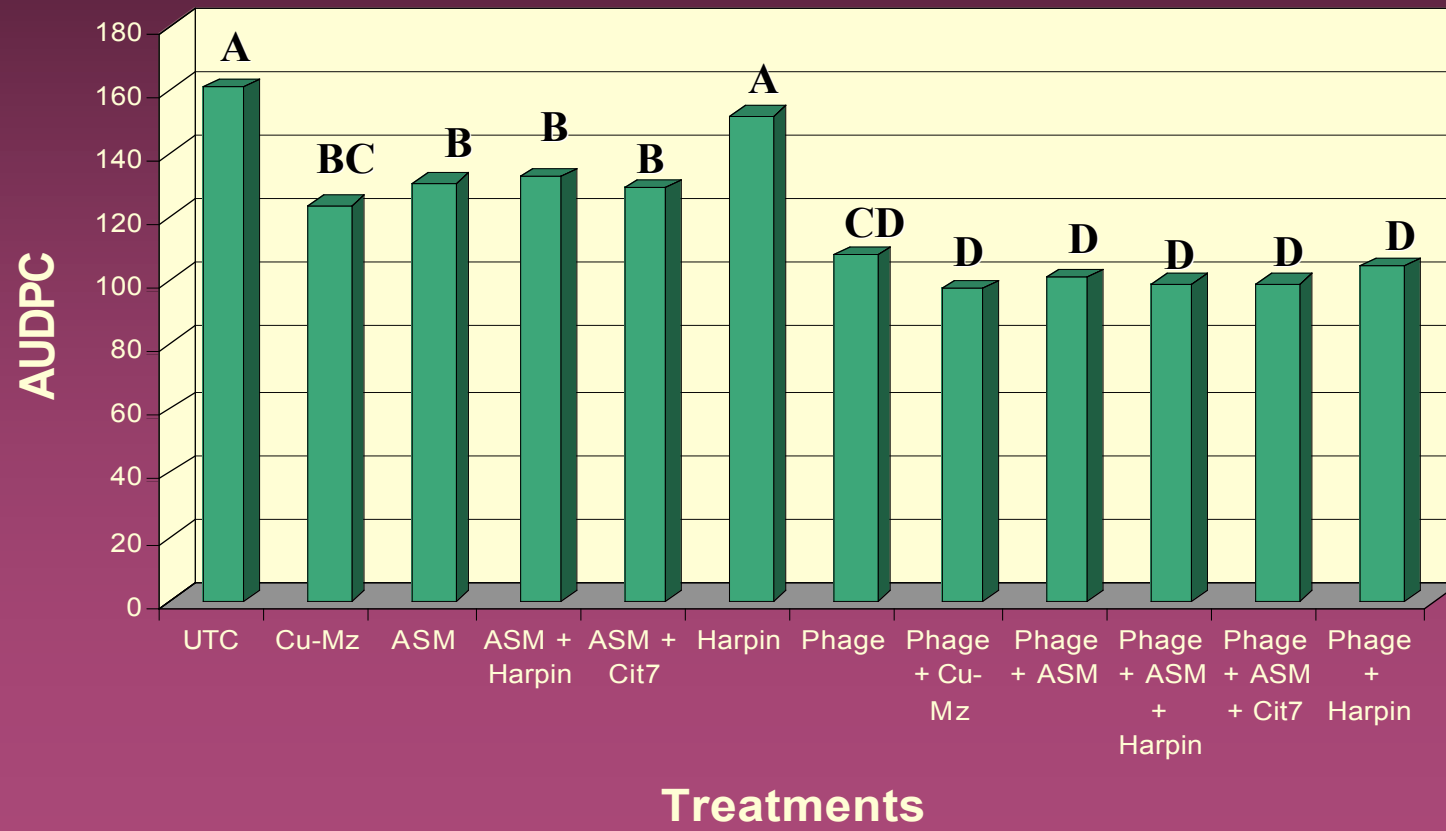


## Spring, 2002: Treatments

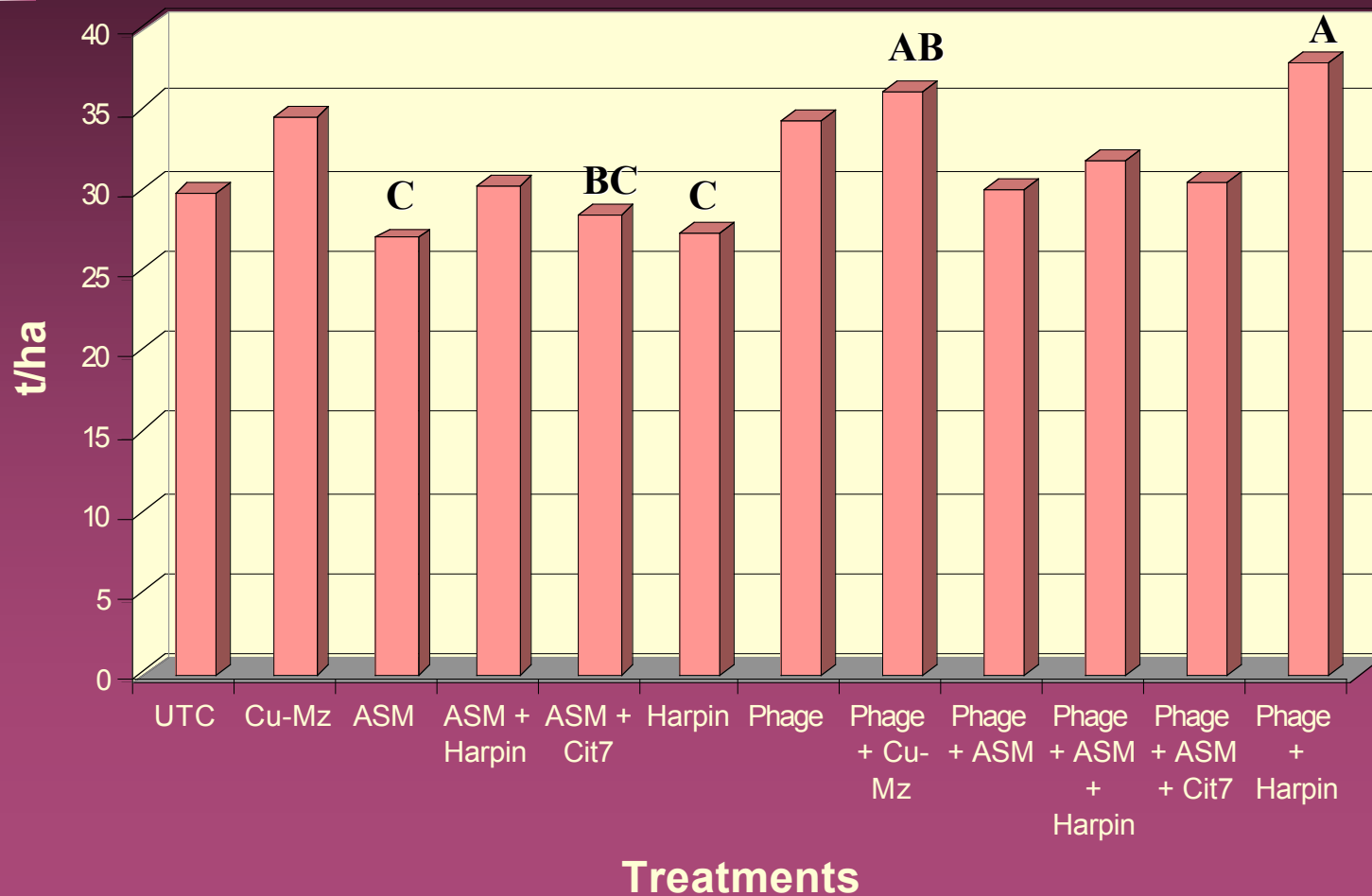
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1. UTC
2. Kocide + Pencozeb
3. Actigard
4. Actigard, Messenger
5. Actigard, Cit7
6. Messenger
7. Bacteriophage
8. Bacteriophage, Kocide + Pencozeb
9. Bacteriophage, Actigard
10. Bacteriophage, Actigard, Messenger
11. Bacteriophage, Actigard, Cit7
12. Bacteriophage, Messenger

# Spring, 2002: Bacterial spot severity as area under disease progress curves (AUDPC)

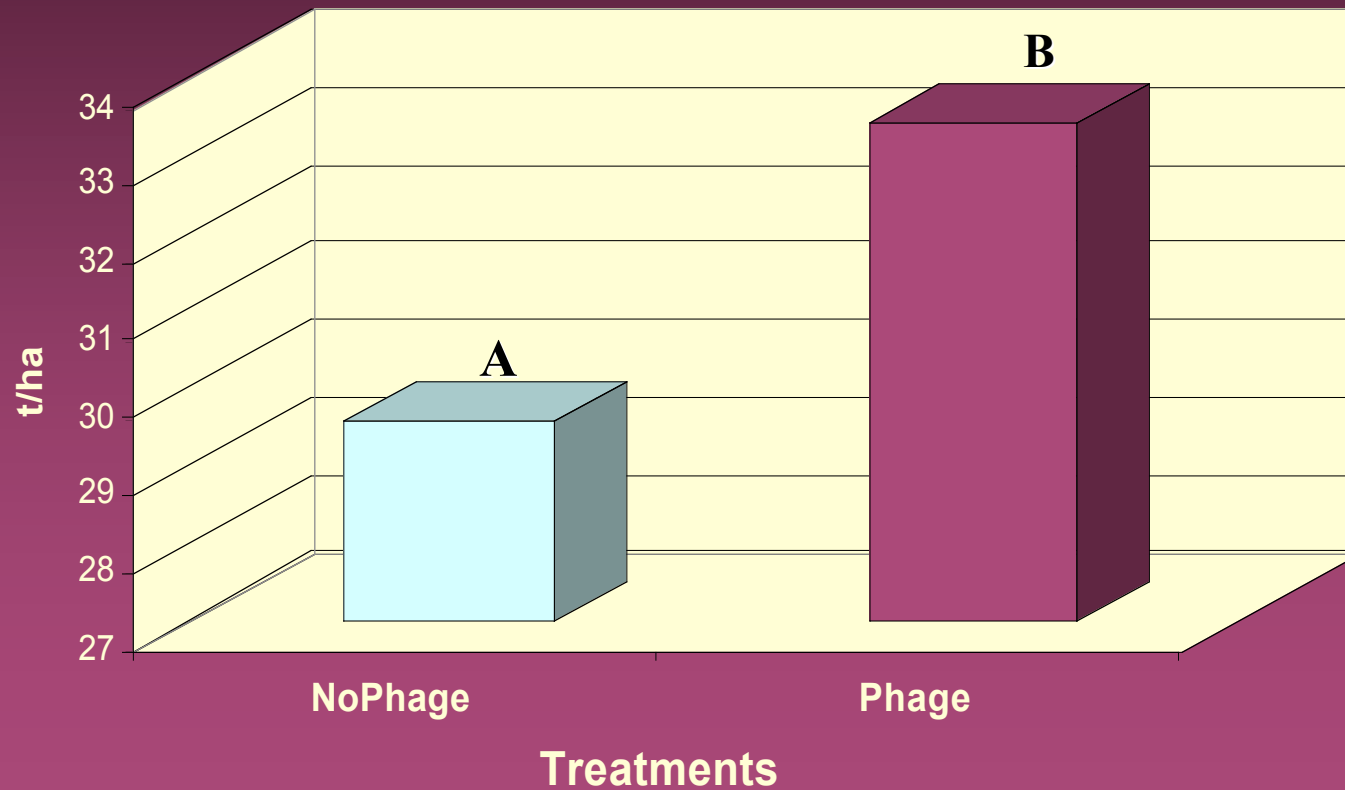


# Spring, 2002: Effect of investigated treatments on total tomato marketable fruit yield





# Spring, 2002: “NoPhage” vs. “Phage” treatments comparison of total marketable fruit yield





# Conclusions

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- ❖ Acibenzolar-*S*-methyl in combination with bacteriophage mixture significantly reduced bacterial spot severity compared to untreated control or standard Cu-Mz treatment in both experiments.
- ❖ “Phage” treatments controlled the disease significantly better than “NoPhage” treatments in the spring 2002, and contributed to significantly higher yield of total marketable fruits in both experiments.



# Conclusions

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- ❖ Harpin could not control the disease but combination with bacteriophage provided numerically the highest yield of total marketable fruits in both experiments.
- ❖ Combination of SAR inducers and Bacteriophages is an efficient alternative strategy for control of tomato bacterial spot.