Managing bacterial blight in carrot seed production using copper hydroxide

(*Xanthomonas campestris* pv. *carotae*)

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Bactericides for carrot bacterial blight:

- Copper hydroxide (e.g., Kocide) = most effective products available
- Synergistic effect from mancozeb + copper?
- WSDA, IDA, ODA approved SLNs for ManKocide DF in seed carrots
- On-going research on bactericide efficacy:

  Crowe & Simmons, 2006 & 2007.
  du Toit & Derie, 2005. F&N Tests 60:V046.
  du Toit et al., 2006. F&N Tests 61:V042.

Objectives of 2007 greenhouse trials:

- Effect of Tanos (famoxadone + cyprodinil) on efficacy of copper hydroxide (Kocide & ManKocide)
- Effect of inoculum concentration & timing of ManKocide applications on management of bacterial blight

Materials & Methods: Tanos trial

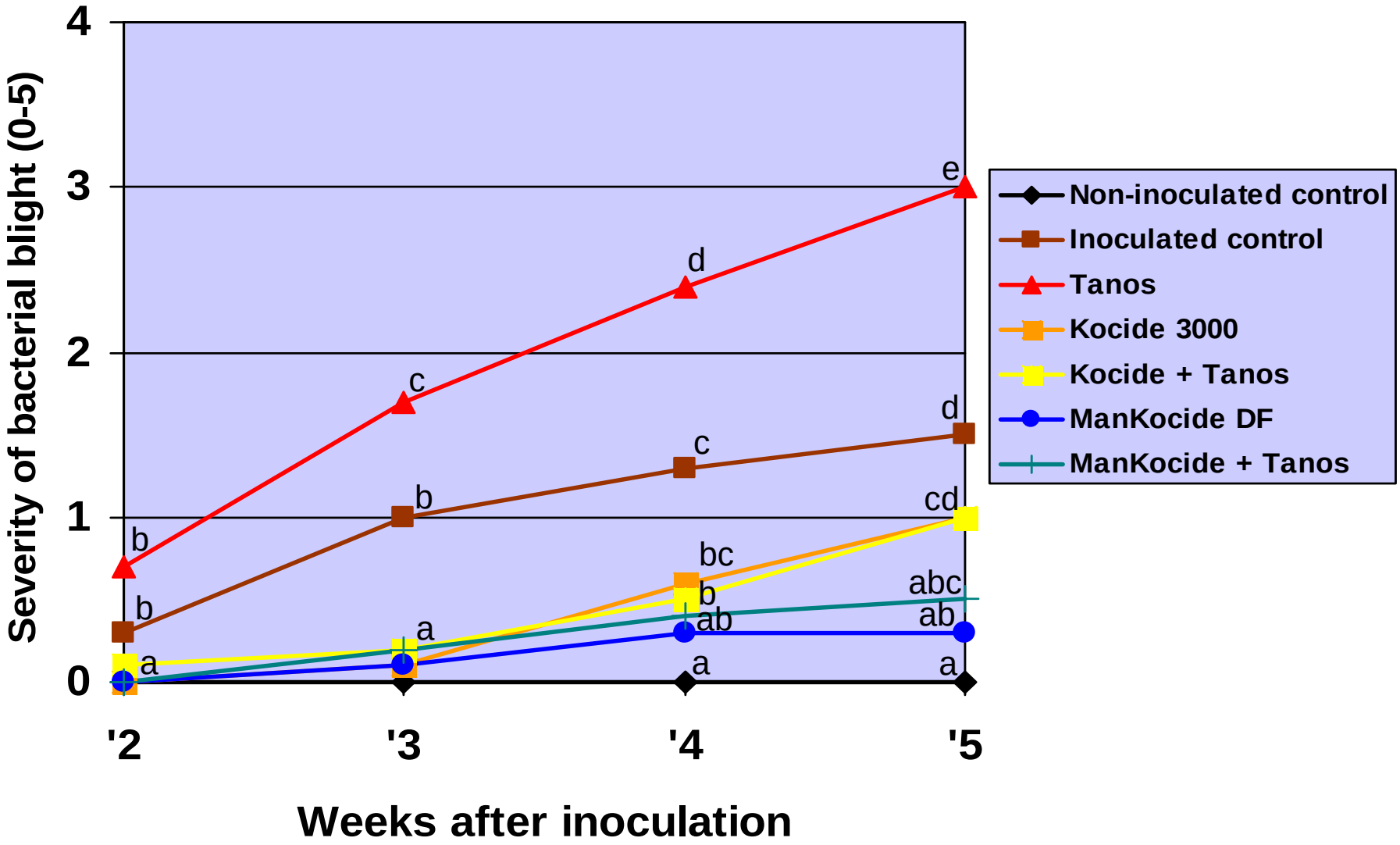
Treatments

1. Non-inoculated, no bactericide
2. Inoculated, no bactericide
3. Tanos (8.0 oz/acre)
4. Kocide 3000 (0.75 lb/acre)
5. Kocide 3000 + Tanos (8.0 oz/acre)
6. ManKocide DF (2.5 lb/acre)
7. ManKocide DF (2.5 lb/acre) + Tanos (8.0 oz/acre)

- RCB design with 10 replications
- CO_2-pressurized backpack sprayer at 49.5 gpa & 40 psi
- *X. campestris* pv. *carotae* inoculum: 10^6 cfu/ml
- Incidence/severity rated weekly, foliage assayed

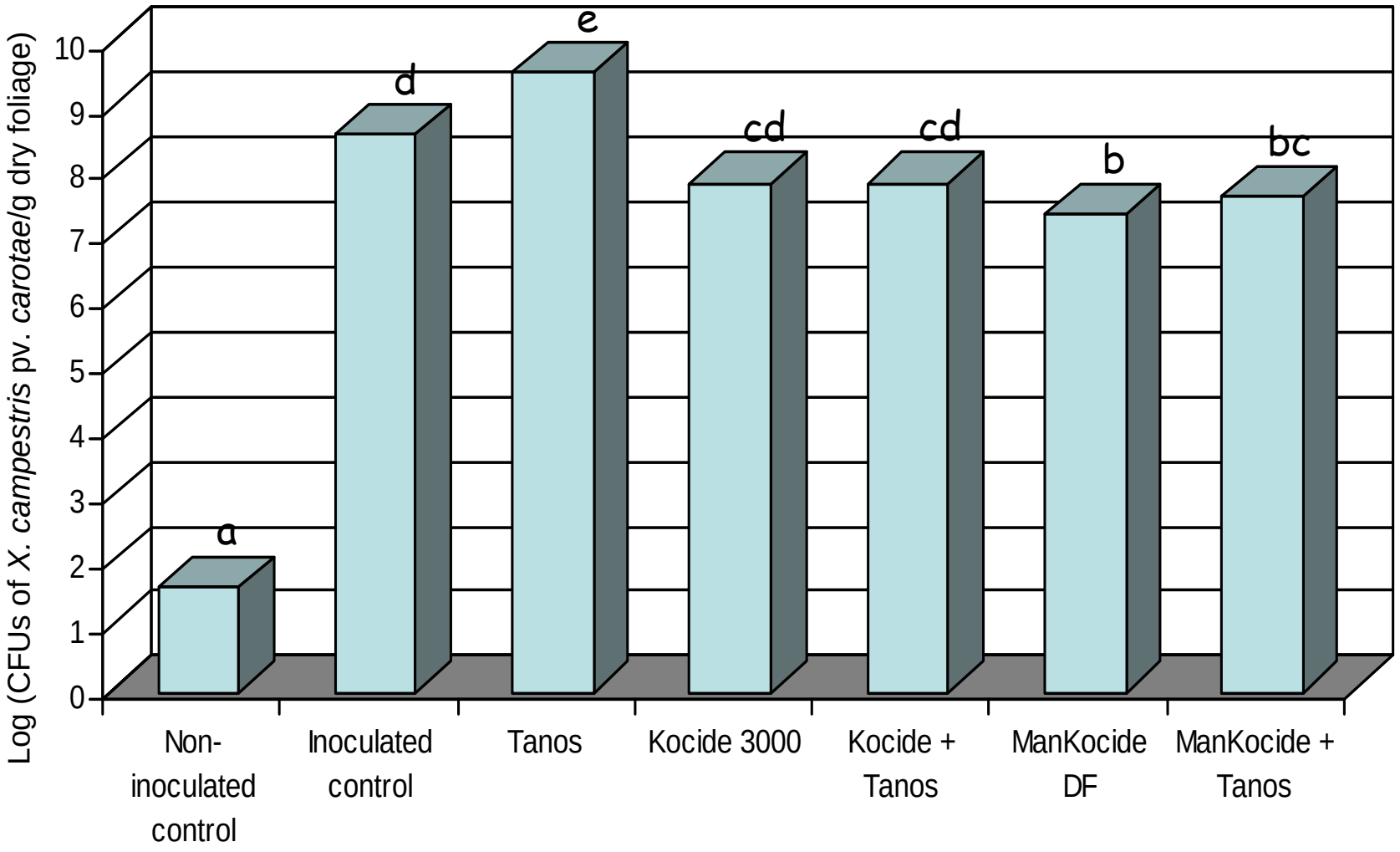
Results: Tanos trial

Severity of bacterial blight (scale of 0 to 5)



Results: Tanos trial

Log (CFUs of *X. campestris* pv. *carotae*/g dry foliage)



Summary: Tanos Trial

- From 3 wks > inoculation, plants with Tanos alone had more severe symptoms than any other treatment
- Highest population of pathogen on plants with Tanos alone
- Tanos did not improve efficacy of Kocide or ManKocide
- No Section 24c registration for Tanos in carrot seed crops in OR or WA
- ManKocide had greater efficacy than Kocide

Materials & Methods: Inoculum concentration trial

Treatments

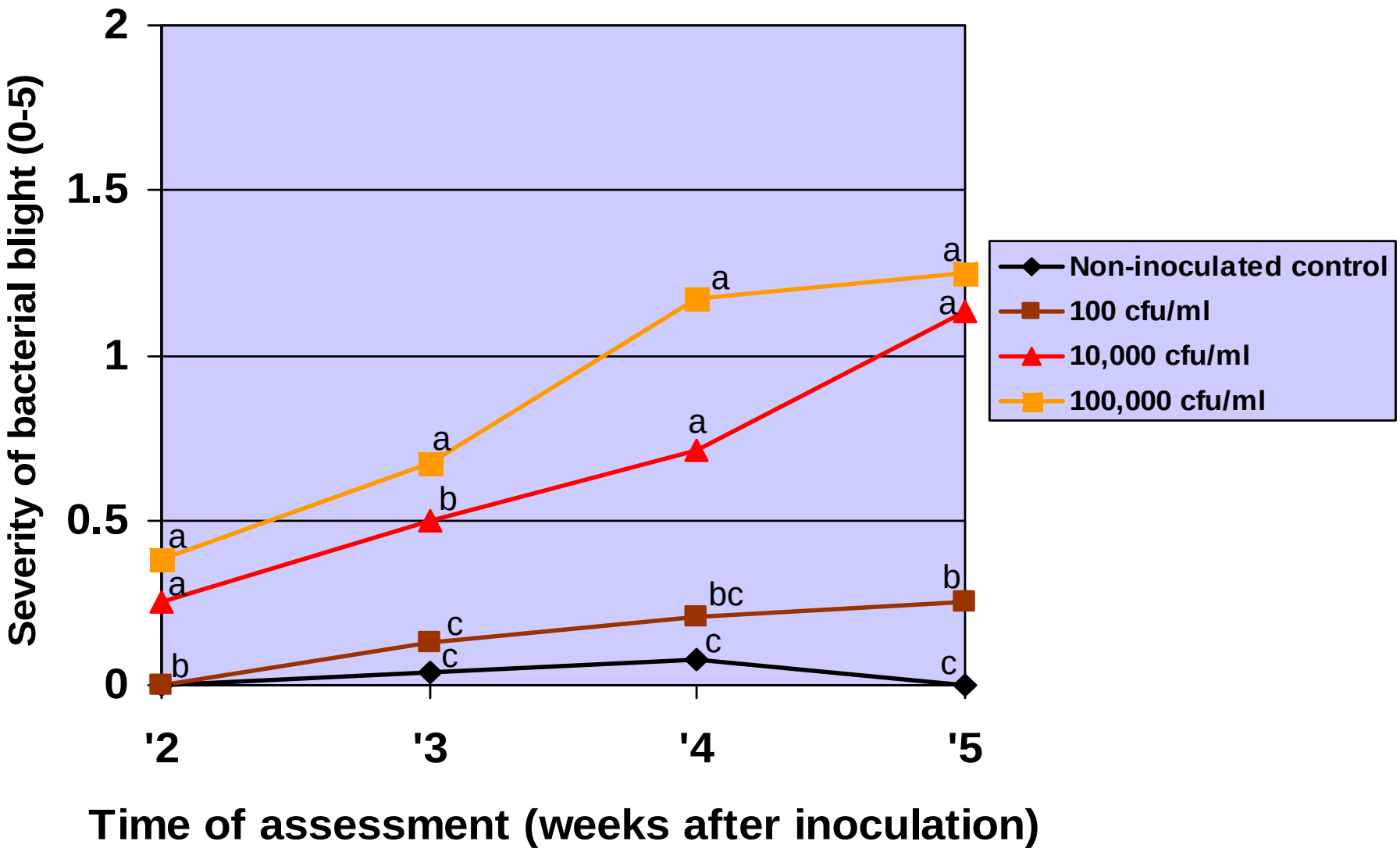
a) Inoculum concentration
   1. 0 cfu/ml
   2. 10^2 cfu/ml
   3. 10^4 cfu/ml
   4. 10^6 cfu/ml

b) Timing of ManKocide application
   1. No ManKocide DF
   2. ManKocide DF (2.5 lb/acre) pre-inoculation
   3. ManKocide DF post-inoculation
   4. ManKocide DF pre- + post-inoculation

RCB design with 6 replications

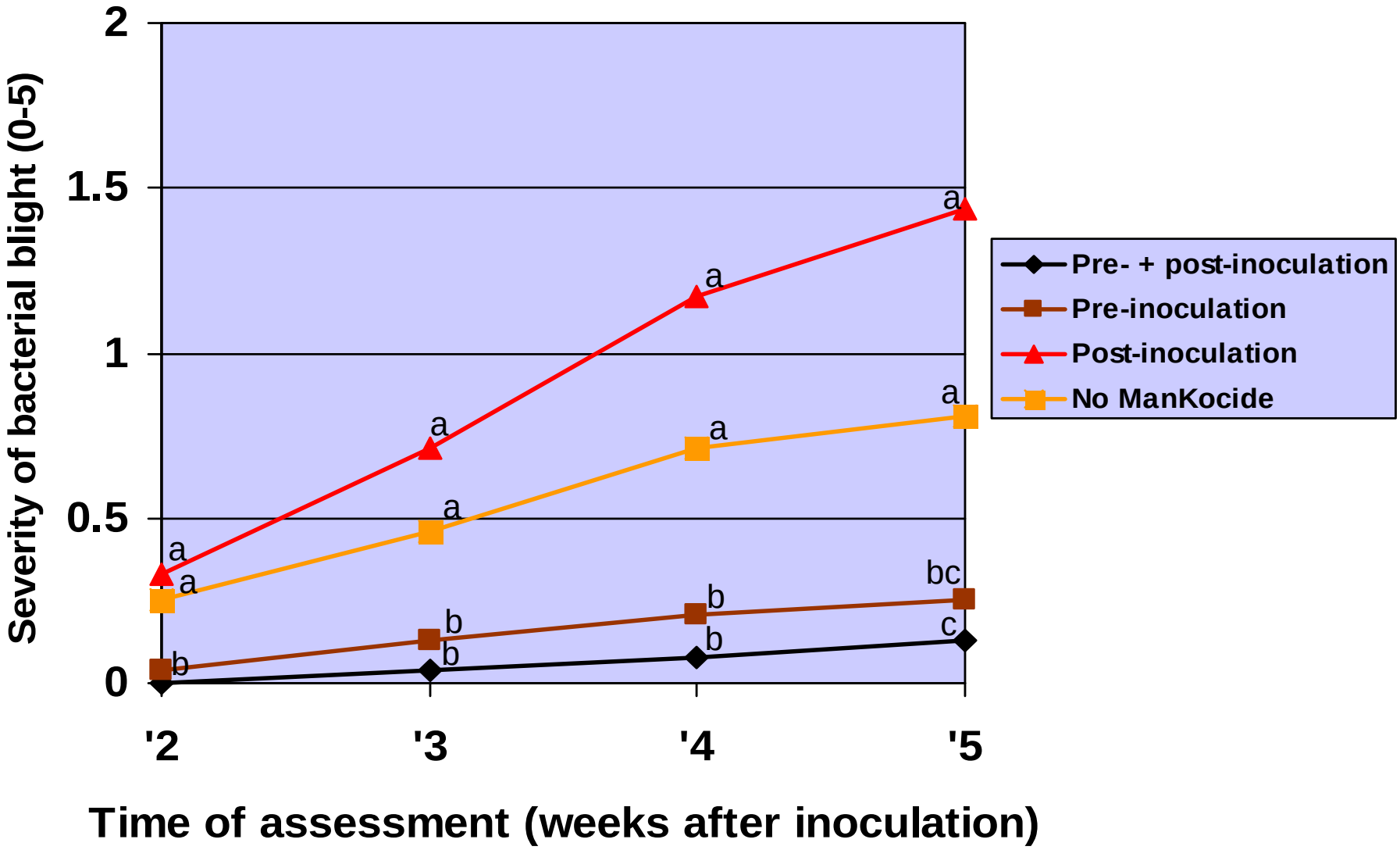
Results: Inoculum concentration

Inoculum concentration



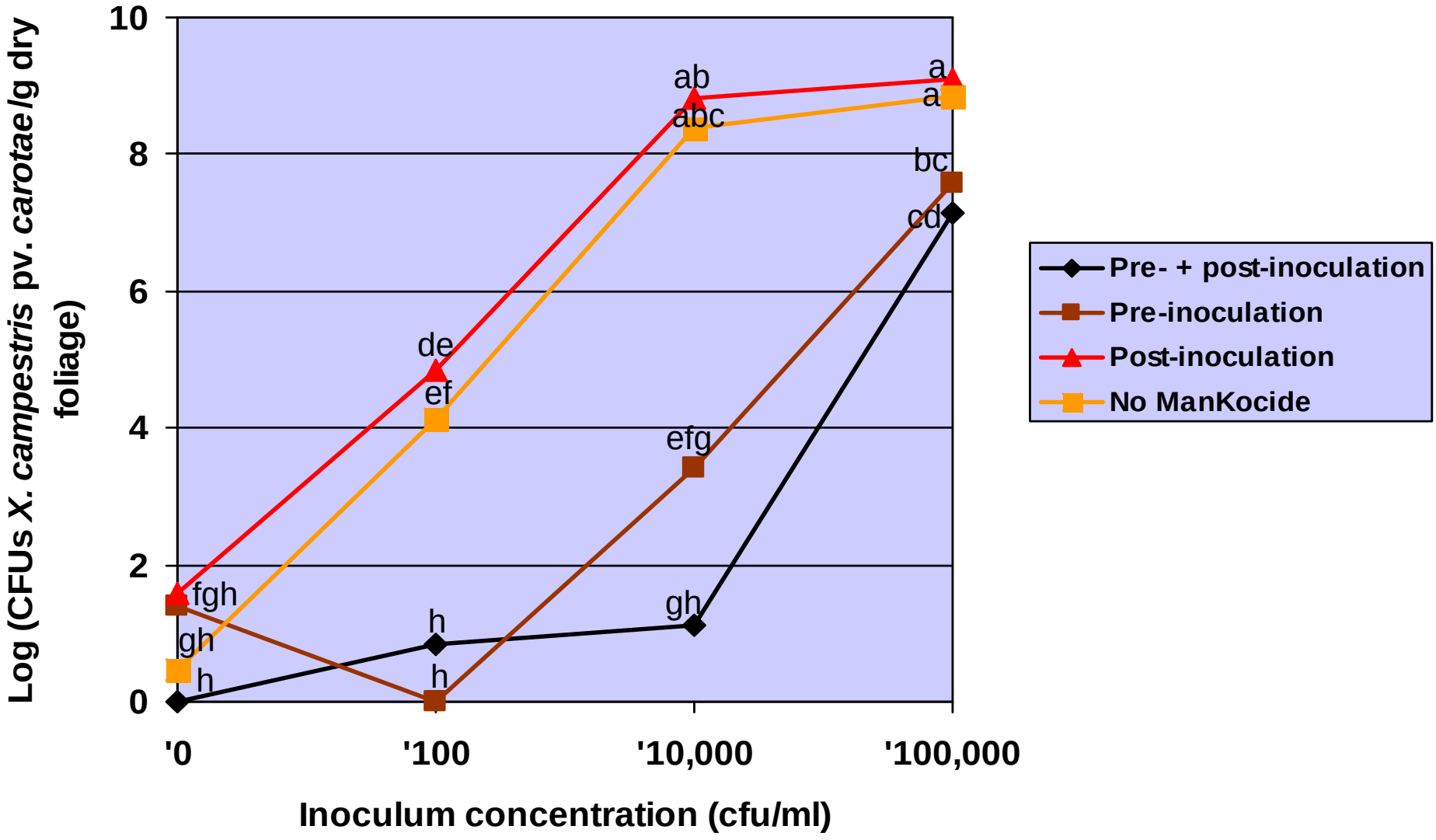
Results: Inoculum concentration

Timing of ManKocide DF application



Results: Inoculum concentration

Interaction: inoculum concentration & timing of ManKocide application



Summary: Inoculum Concentration Trial

- Symptoms observed 15 d > inoculation with 10^4 or 10^6 cfu/ml, but only at 36 d for 10^2 cfu/ml
- Plants treated with ManKocide post-inoculation or not treated had more severe disease & higher populations of *X. c. carotae* vs. ManKocide applications pre- or pre- + post-inoculation
- Importance of preventative applications of ManKocide
- Limited efficacy of ManKocide against high inoculation rates of the pathogen

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