

Garlic Postharvest Handling Trials

{ Year One Results
{ Long Island Ag Forum



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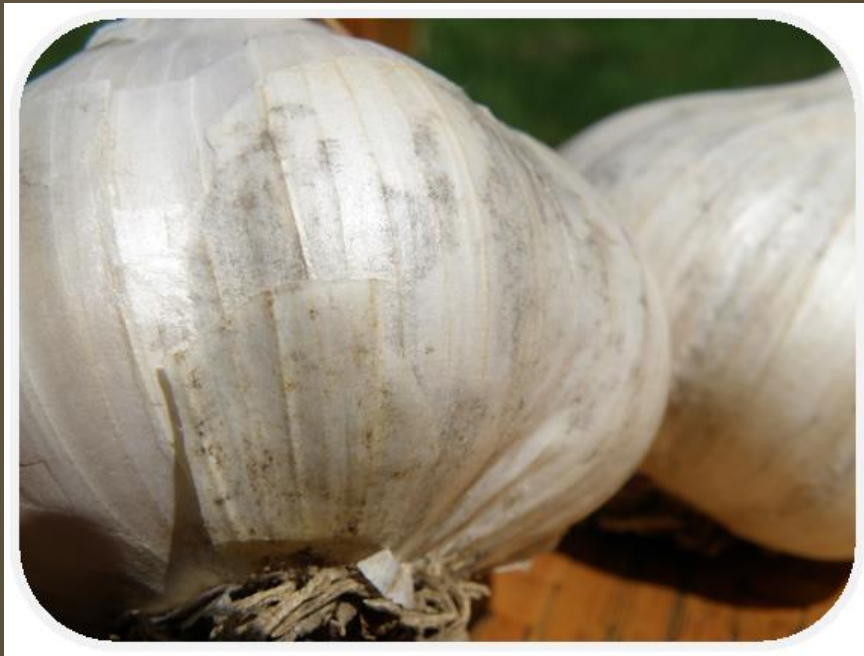
Postharvest concerns

Since the arrival of Garlic Bloat Nematode growers have been more vigilant in looking for problems

Testing over the past 2 years has shown that only a small percentage (less than 25%) of samples are GBN positive

The remaining 75% of problems are other diseases and disorders

Diseases of garlic



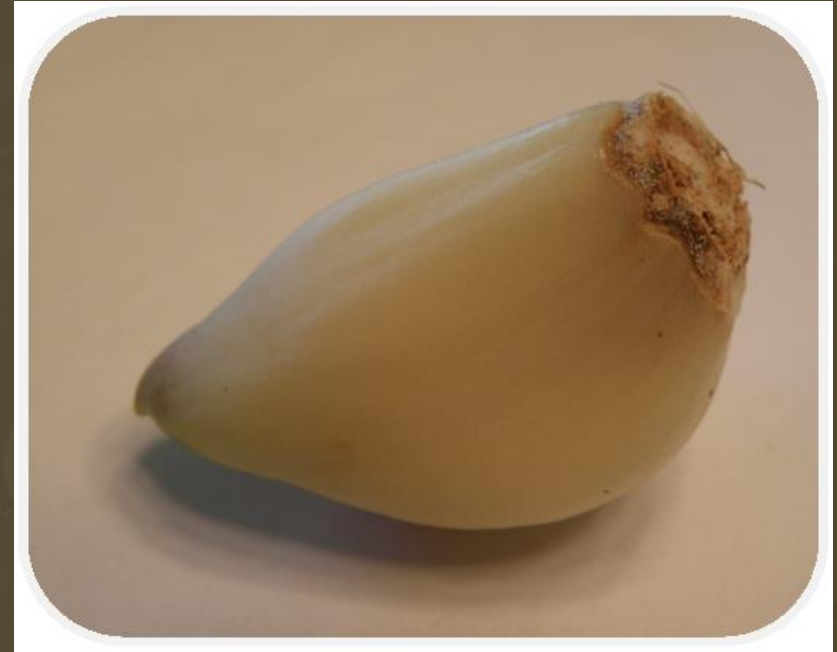
Embellisia (left) and Aspergillus (right). These two diseases are largely cosmetic, but can negatively affect the marketability of garlic. Closely tied to postharvest handling.

Disease continued



Penicillium blue mold (left) and Botrytis neck rot (right). Both diseases are airborne and widely present, but post-harvest conditions play a role in disease severity.

Diseases continued



Fusarium bulb rot (left) and Fusarium basal rot (right). Both diseases are seed or soil borne, but symptoms will be more severe under poor post-harvest conditions.

What can we do to reduce disease issues?

- Examined treatments that farms are currently successfully using
- Developed protocols based on these approaches
- On farm trials!



Experimental treatments

A	Trim Roots flush with basal plate
B	Trim tops to 6" long
C	Wash
D	Cure in High Tunnel
E	Cure in open-air structure
F	Leave Roots and tops un-cut

Treatments were combined in every possible combination, for a total of 16 treatments.

Treatment combinations

A=Trim roots flush with basal plate
B= Trim tops to 6" long
C= Wash D=cure in high tunnel
E=Cure in open-air structure
F= leave roots and tops un-cut

F+E	F+D	A+E	A+D
A+E+C	A+D+C	A+E+B	A+D+B
A+E+C+B	A+D+C+B	B+E	B+D
B+C+D	C+E	C+D	B+C+E



A. Root Pruning. Roots were cut while garlic was still moist using a knife or pruning shears. Care was taken not to damage the basal plate.



B. Top cutting. Tops were cut to a height of six inches while garlic was green. The mechanical cutting showed some variation of height.

Top cutting



Tops cut 6" tall with sickle-bar mower. Greens left in field. Garlic was undercut to harvest.

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C. Washing was completed using a garden hose and a nozzle. Power washers were not used. After washing, garlic was air dried before being placed in the curing area. Garlic was washed until dirt was removed from the bulb.



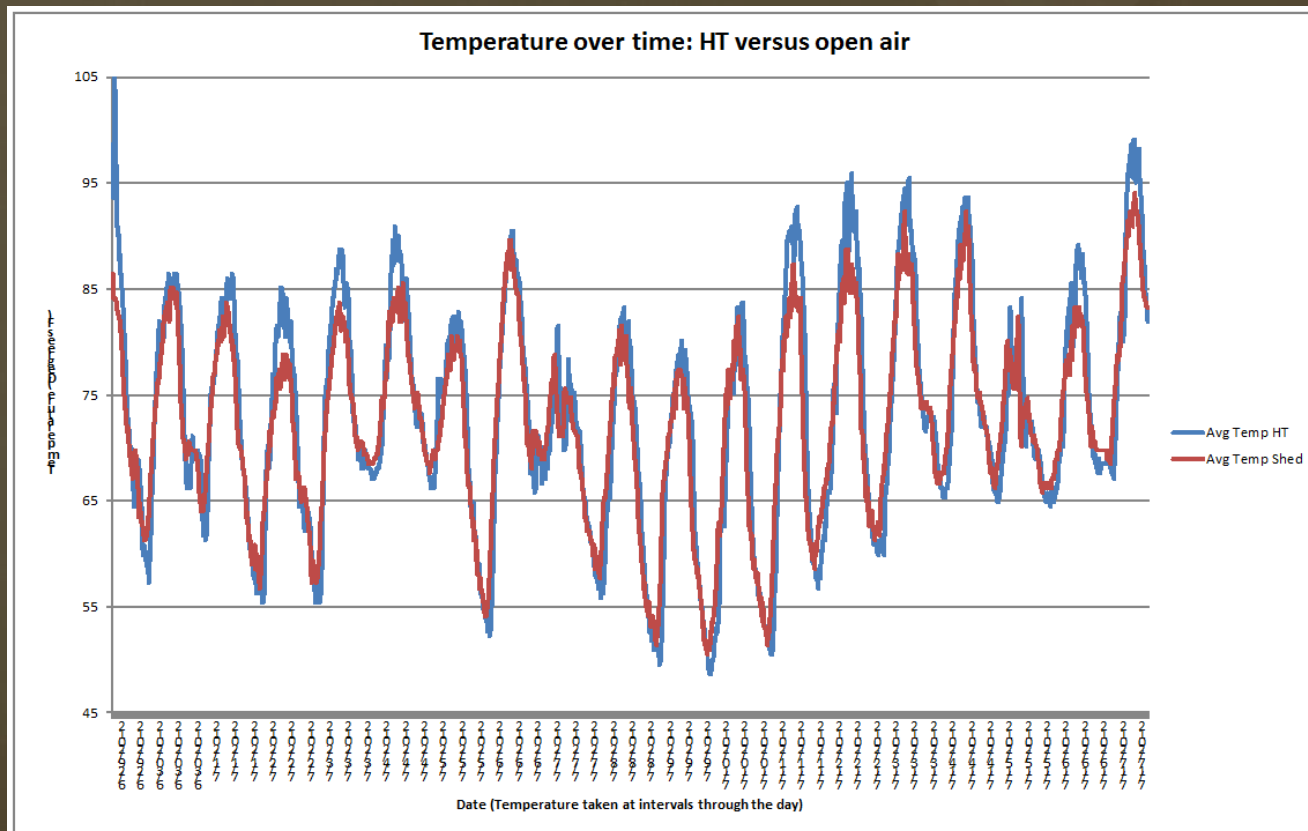
D. Curing in high tunnels: Garlic was moved to high tunnels immediately after other treatments were completed. All high tunnels had a shade cloth and were ventilated with fans, preventing temperatures from exceeding 110 degrees F.



E. Open-Air Curing: These treatments were placed in solid but well-ventilated buildings such as barns and sheds to dry without supplemental heat from the sun.

About High Tunnel Drying

The high tunnel drying temperatures for this year were kept conservatively cool, relative to the outdoor temperatures. Temperatures inside only averaged about 5 degrees warmer in the tunnel than outside. Next year temperatures will be increased to an average of 110°F during the day in the high tunnel. Overall this was a warm, dry curing season whether drying in a tunnel or in an open air system. Increased benefits of the high tunnel system are expected in cooler years.





F. Roots and tops

uncut: Garlic was left completely uncut in this treatment. It was spread out on drying racks to leave space for the bulbs to be one layer deep or it was tied into bundles of 6-10 and hung.

Results: HT vs Open Air

- ⌘ Across the three trials, garlic in high tunnels dried an average of three days faster in high tunnels than in open air structures.
- ⌘ Garlic dried in high tunnels had slightly better wrapper quality (tighter, less discoloration) at one site.
- ⌘ Garlic dried in tunnels also had slightly lower disease incidence (*Aspergillus* and *Embellisia*) in two of the three sites, though disease was not severe in any site or treatment.
- ⌘ No garlic treatments showed damage from being dried in the high tunnel.

Results: Root Trimming

↳ **Trimmed vs. untrimmed:**
No statistically significant differences were observed between these treatments in regards to bulb quality, weight, or disease incidence.



Treatment: Roots trimmed, tops trimmed, washed, open-air dried

Results: Trimming Tops

Benefit: Speed of harvest is increased

Space taken up in drying area is reduced

Amount of moisture introduced to drying area is reduced

Possible Drawback: bulbs with cut tops had slightly lower average weight

Farm	Average Weight/Bulb Tops Cut	Number of bulbs in sample	Average Weight/Bulb Tops Uncut	Number of bulbs in sample
1	0.11	386	0.15	375
2	0.11	346	0.1	365
3	0.12	304	0.14	232

What does that reduced weight mean?

If you grow 10,000 bulbs, sold at \$8 per pound:

Average cut weight: 0.11

Average uncut weight: 0.13

Difference: 0.02 lbs/bulb, or 200 lbs * \$8 = \$1600

BUT

If you lose 20% of your crop to disease due to poor storage, you lose

$10,000 * 0.13 = 1300 \text{ lbs} * .20 = 260 \text{ lbs loss}$

Results: Washing bulbs

Washed garlic looked very good initially, but became more discolored than the unwashed garlic during the drying and curing process. Disease incidence, particularly *Aspergillus* and *Embellisia*, was slightly higher in washed garlic.

Additional question: In a wet year, would washing mud from bulbs be better than leaving large amounts of dirt on them?



R to L: Immediately after washing, after curing, 1 leaf removed, two leaves removed

Year one conclusions

- ⌘ Drying garlic in HT did not cause post-harvest breakdown or increase disease incidence
- ⌘ Cutting the tops at approximately 6 inches did not increase post-harvest breakdown or increase disease incidence
- ⌘ Washing garlic immediately improved appearance but had minor effect on long-term appearance and disease incidence

Year two questions

- ⌘ What is the effect of increasing the temperature to 100-110 degrees F in the high tunnel?
- ⌘ Is it possible to cut garlic tops to 1-2 inches in the field and maintain good storage quality?
- ⌘ Can reducing relative humidity in the high tunnel at night further reduce disease problems?
- ⌘ What are the effects of washing garlic in a wet year?

For more information...

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