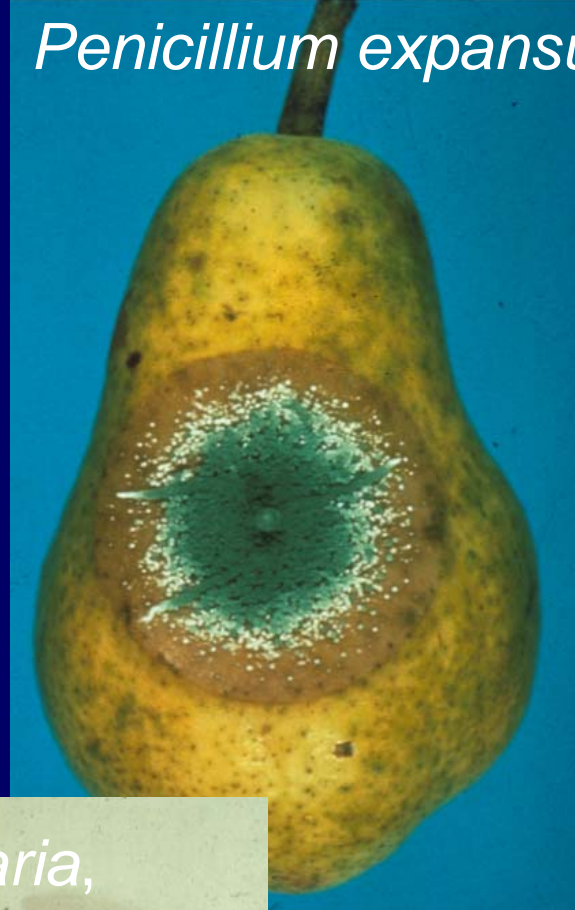


# Alternatives to Fungicides for Pear Postharvest Decay Control

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*Penicillium expansum*



*Botrytis cinerea*



*Cladosporium, Alternaria, Phialophora*



## Orchard Treatments

1. Untreated
2. Calcium chloride  
6 g Ca / liter x 3
3. Messenger  
(harpin protein)  
250 mg / liter x 3

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1. Water (line-spray)
2. Chitosan (resistance stimulant)
3. StorOx (peroxyacetic acid,  
oxidizing agent)
4. Sodium bicarbonate
5. BioSave 110 (*Pseudomonas syringae*)
6. Thiabendazole (fungicide standard)

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## Storage Treatments

X

1. Standard perforated polyethylene box-liner
2. LifeSpan modified atmosphere packaging (MAP)

# Orchard

5 random  
replicate  
tree groups  
per treatment

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12 boxes of  
~100 fruit each  
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**Wound**  
2 mm x 3

**Natural  
inoculum**

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2 mm x 3  
Natural  
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Each  
postharvest  
treatment  
applied to  
2 boxes  
per orchard  
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Wound  
2 mm x 3  
  
Natural  
inoculum

## Postharvest

Each  
postharvest  
treatment  
applied to  
2 boxes  
per orchard  
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## Storage

1 box per  
postharvest  
x orchard  
replicate  
to standard liner,  
1 box to MAP.



All stored 4 months at 0 °C

# Results



# 1. Orchard Treatments

	Percentage of wounds infected	
	Year 1	Year 2
Check	6.9 a	22.0 a
Messenger	5.7 a	16.8 a
Calcium chloride	3.1 b	7.3 b

## 2. Postharvest Treatments

	Percentage of wounds infected	
	Year 1	Year 2
Chitosan (Elexa 4)	12.6 a	29.6 a
StorOx	4.8 b	22.3 a
Check	3.4 bc	22.2 a
Thiabendazole	3.6 bc	8.3 b
BioSave 110	4.0 bc	5.1 c
Sodium bicarbonate	2.8 c	4.7 c

Chitosan 5% phytotoxicity



Sodium bicarbonate 5%  
peel darkening

### 3. Storage Treatments

	Percentage of wounds infected	
	Year 1	Year 2
Check (Standard liner)	6.4 a	17.8 a
LifeSpan MAP	4.0 b	13.0 a

# Effect of Orchard Treatment on Gas Content in MAP

	Average gas content in LifeSpan MAP	
	Oxygen	Carbon dioxide
Check	11.9 a	3.6 a
Messenger	11.9 a	3.7 a
Calcium chloride	13.7 b	2.8 b

# Orchard Check – Year 2

	Percentage of wounds infected	
Postharvest treatment	Standard liner	LifeSpan MAP
Check	44.2 a	32.7 a
Chitosan	41.9 a	32.7 a
StorOx	47.5 a	20.0 ab
Thiabendazole	11.1 b	11.7 b
Sodium bicarbonate	9.8 b	2.5 b
BioSave 110	7.7 b	2.6 b

# Orchard Calcium – Year 2

	Percentage of wounds infected	
	Standard liner	LifeSpan MAP
Chitosan	20.5 a	23.4 a
Check	11.1 ab	5.3 b
StorOx	3.4 b	6.1 b
Thiabendazole	2.4 b	5.3 b
Sodium bicarbonate	2.3 b	1.5 b
BioSave 110	3.8 b	2.1 b

# Most Effective Program (without Phytotoxicity)

## Year 1

<b>Orchard</b>	<b>Postharvest</b>	<b>Storage</b>	<b>% infected wounds</b>
Check	Water	Standard liner	5.7 a
Calcium chloride	BioSave 110	LifeSpan MAP	3.3 a

## Year 2

<b>Orchard</b>	<b>Postharvest</b>	<b>Storage</b>	<b>% infected wounds</b>
Check	Water	Standard liner	44.2 a
Calcium chloride	BioSave 110	LifeSpan MAP	2.1 b