

# Ethylene: The Invisible Load Killer

How ethylene producers (apples, stone fruit, tomatoes...) ruin greens, flowers, and green-sensitive vegetables in the same trailer. Management rules, scrubbers, and USDA group conflicts.

ProspectSentinel

~11 min read

USDA AH-66 + HB 669

For shippers &amp; reefer desks

Cold Chain Index

Transit Guide

## Executive brief

Ethylene ( $C_2H_4$ ) is a ripening hormone and stress signal. Some commodities produce a lot of it; others are injured or forced into premature senescence by tiny concentrations. AH-66's ethylene chapter and HB 669's mixed-load rules converge on one freight truth: **producer/sensitive pairing is a load design problem**, not a driver preference.

### Do not co-load high ethylene producers with green-sensitives

#### PRODUCERS (examples)

Apples · avocados · bananas  
Cantaloupe · honeydew  
Peaches · pears · plums · tomatoes



#### SENSITIVES (examples)

Leafy greens · broccoli · flowers  
Cucumbers · peppers (green color)  
Group 6a / 6b cole & greens

HB 669 names high producers and warns that ethylene production is lower near freezing — venting and scrubbers help but separation is primary.

## Producers named in the transport handbook

HB 669 explicitly calls out significant ethylene producers: apples, avocados, bananas, cantaloupes, honeydew melons, peaches, pears, plums, and tomatoes. Commodities that should retain green color — bananas, cucumbers, peppers — should not ride with heavy producers. Leafy greens, broccoli, many flowers, and nursery stocks are classic victims.

**Group translation:** USDA Group 1 (often high-ethylene fruit at 32–34°F) vs Groups 6a/6b (leafy/cole at high RH) is the signature conflict. See [Produce Shipper Transit Guide](#) Mix load and [Cold Chain Index](#) Co-Load Checker.

## Management stack (in priority order)

1. **Do not co-load** producers with sensitives when avoidable.
2. **Lower temperature** reduces ethylene production rate (HB 669) — helpful but not a free pass to mix.
3. **Vent / air exchange** to purge buildup when equipment and weather allow.
4. **Commercial scrubbers** exist; treat as mitigation, not absolution.
5. **1-MCP and packaging strategies** appear in AH-66 science; they are shipper/program tools, not broker improvisation on the yard.

## Odor is not ethylene — but it also kills loads

HB 669 pairs odor emitters (apples, citrus, onions, pineapple, fish, etc.) with absorbers (dairy, eggs, meat, nuts; some fruit both emit and absorb). Pineapple next to avocados is a named risk. Keep odor logic in the same checklist as ethylene.

## Worked desk example

**Request:** "Apples + broccoli, one reefer, 34°F, Friday." **Answer:** Temperature band overlaps; ethylene compatibility does not. Offer split pickups, multi-temp with sealed bulkhead discipline, or re-sequence commodities. Document the refusal reason with a link to Groups 1 vs 6.

Interactive proof for the customer: [Cold Chain Index](#) and [Produce Shipper Transit Guide](#).

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## FAQ

- ▶ Is this official USDA guidance?
- ▶ Can I share these with customers?
- ▶ Where are the interactive tools?

## Sources & interactive tools

- [USDA AH-66 — The Commercial Storage of Fruits, Vegetables, and Florist and Nursery Stocks \(2016\)](#).
- [USDA AMS HB 669 — Protecting Perishable Foods During Transport by Truck](#)
- **Federal rules (eCFR):** [7 CFR Part 46 — PACA regulations](#) · [49 CFR Part 370 — Principles and practices for the investigation and voluntary disposition of loss and damage claims](#)
- [Cold Chain Index](#) — 200+ commodity storage/transit matrix + co-load checker
- [Produce Shipper Transit Guide](#) — dock setpoints, mix load, checklist
- [Reefer Precool Time Estimator](#) — half-cooling-time style estimator
- [Perishable Claim Analyzer](#) · [PACA Good Arrival Calculator](#) · [Produce Truck Rate Explorer](#)
- [Freight claim package checklist](#) · [Claim / Carmack deadline calculator](#)

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This publication modernizes and explains **public USDA guidance** and, where noted, points to **public federal regulations on eCFR.gov** for educational use by shippers, brokers, carriers, and operators. It is **not** an official USDA or DOT document, and it is **not** legal, insurance, PACA advocacy, food-safety certification, or professional claims advice. Always verify current commodity specifications, contracts, and the *current* eCFR text with the controlling authority and your counsel.

Primary sources: USDA-ARS Agriculture Handbook 66 (2016); USDA-AMS Handbook 669, *Protecting Perishable Foods During Transport by Truck* (1995, reprinted 2008), including Load Compatibility Groups from USDA Marketing Research Report 1070 (Lipton & Harvey, 1977). Selected federal regulation entry points: [7 CFR Part 46 \(PACA\)](#); [49 CFR Part 370 \(freight claims\)](#).

## Full series

- 00 Cold Chain Operating System
- 01 The Reefer Is Not a Precooler
- 02 Colder Is Not Safer
- 04 USDA Groups 1–8: The Mixed-Load Playbook
- 05 Airflow, Load Patterns & Multi-Temp Zones
- 06 Commodity Setpoint Desk Guide
- 07 Protein, Dairy & Eggs on the Same Trailer
- 08 CA, MAP & When Gas Matters
- 09 From Temperature Log to Claim
- 10 Seasonal Produce Desk

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