

SOIL FUMIGATION

STEVE GODBEHERE

FOREST TREE NURSERY
MANAGEMENT SHORT COURSE
SEPTEMBER 2, 2008



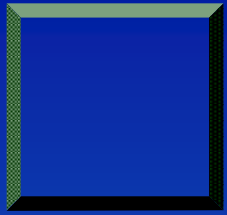
METHYL BROMIDE ALTERNATIVE RESEARCH

WHERE ARE WE TODAY?

July 19, 2001

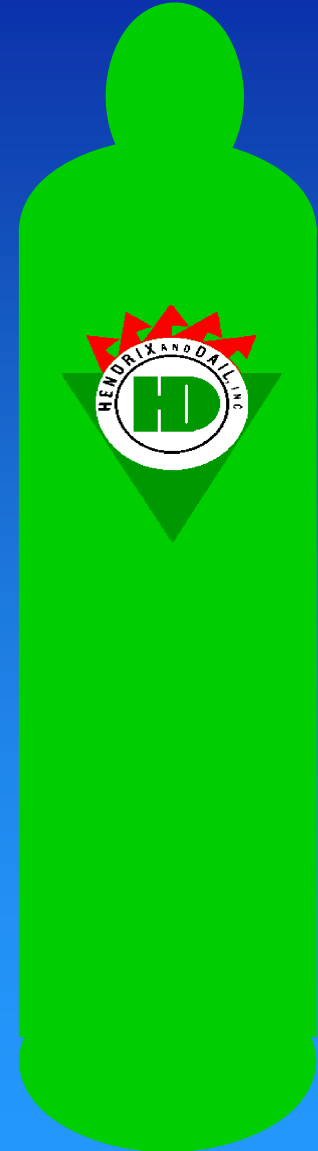
Steve Godbehere

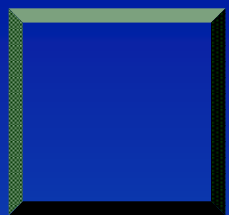




METHYL BROMIDE

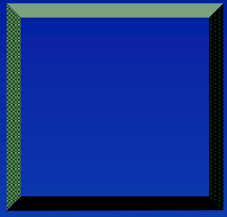
- Wide spectrum organic biocide
- Selective (Tricoderma populations increase after fumigation)
- Low problems with resistance management
- Not carcinogenic
- Does not pollute ground water
- Produced by nature
 - f* Algae in oceans
 - f* Salt marshes
 - f* Ecotmycorhizza in forest
 - f* Cole crops
- Long history of worker safety





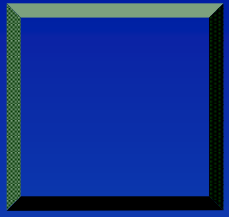
OZONE DEPLETION





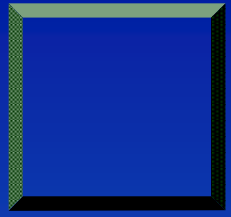
Potential Alternatives

- Cricket Litter
- Steam
- Hot Water
- 1,3 Dichloropropene (Telone)
- Chloropicrin
- Sodium and Potassium Azide
- Propragil Bromide
- Methyl Iodide
- Metham Sodium
- Solarization
- Flooding
- Organic Amendments



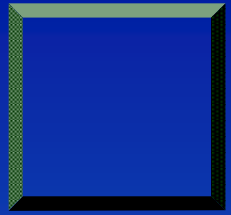
LABELED ALTERNATIVE FUMIGANTS

- 1,3 DICHLOROPROPENE
(TELONE)
- METHAM SODIUM
- CHLOROPICRIN
- BASAMID



TELONE

- BUFFER ZONES
- WORKER PROTECTION
- LACK OF WEED CONTROL
- 21 DAY OR LONGER WAITING PERIOD
- LACK OF ADEQUATE HERBICIDE PARTNERS



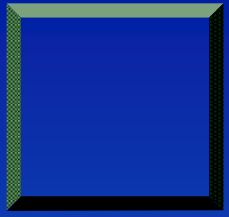
METHAM SODIUM

- SLOW APPLICATION
- HIGH VOLUME
- WEAK NEMATICIDE
- PHYTOTOXIC TO PINES
- CORROSIVE TO EQUIPMENT
- NEEDS TO BE TARPED
- EXTENDED WAITING PERIOD
- NEEDS CO-APPLICATION WITH TELONE OR CHLOROPICRIN



METHAM SODIUM





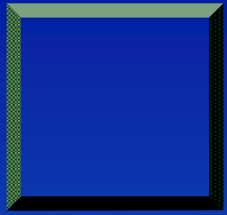
CHLOROPICRIN

f LACK OF WEED CONTROL

f ODOR

f COST

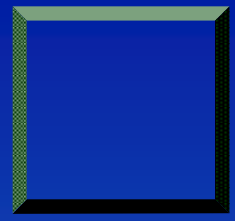




BASAMID



- NARROW APPLICATION WINDOW
- 7 DAY WATERING PROTOCOL
- LACK OF NUTSEDGE CONTROL
- WEAK NEMATICIDE
- SPEED OF APPLICATION
- HANDLING OF BAGS
- REPORTS OF COLLATERAL DAMAGE TO ADJACENT CROPS
- COST



NON-LABELED ALTERNATIVES

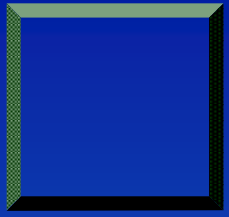
■ METHYL IODIDE

f AT LEAST 3 YEARS TO REGISTER

f APPARENTLY PHYTOTOXIC TO PRUNUS

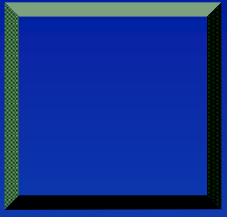
f UNKNOWN COST





SUMMARY

- NO NEW REGISTERED COMPOUNDS
- ALL ALTERNATIVES REQUIRE COCKTAIL MIXTURES
- ALL ALTERNATIVES INCREASE PESTICIDE LOADING
- ALTERNATIVES COST MORE THAN MB FOR LESS CONTROL
- EXTENDED WAITING PERIODS
- REQUIRE TIGHTER APPLICATION WINDOWS



THE GOOD NEWS!

- QPS / CUE

- f* QUARANTINE AND PRE-SHIPMENT

- f* CRITICAL USE EXEMPTION

SOIL FUMIGATION

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HOW BAD IS METHYL BROMIDE?

- **POMBO HEARINGS**
 - 99.6% OF TOTAL MB IS NATURAL
 - 0.4% IS MAN MADE
 - OTHER ESTIMATES LESS THAN 1% MAN MADE
- **OZONE DEPLETION POTENTIAL DOWN TO 0.4**

SOIL FUMIGATION

- CHEMICAL CONTROL STRATEGY USED TO REDUCE POPULATIONS OF SOIL ORGANISMS
 - NEMATODES
 - FUNGI
 - BACTERIA
 - INSECTS
 - WEED SEED
 - WEEDS

SOIL FUMIGATION USES

- AGRICULTURE
- ORCHARDS
- NURSERIES
- ORNAMENTAL BEDDING
- FOREST SYSTEMS
- WILD FLOWER PROJECTS
- GOLF COURSES
- ATHLETIC FIELDS
- WHITE HOUSE LAWN

SOIL FUMIGATION

- Solid Tarp
- Row or Bed
- Raised Tarp
- Greenhouse
- Potting Mix
- Replanting Orchard Sites

KEYS TO SUCCESSFUL SOIL FUMIGATION

- Soil Preparation

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- Soil Preparation
- Soil Temperature

KEYS TO SUCCESSFUL SOIL FUMIGATION

- Soil Preparation
- Soil Temperature
- Soil Moisture

KEYS TO SUCCESSFUL SOIL FUMIGATION

- Soil Preparation
- Soil Temperature
- Soil Moisture
- Fumigant

KEYS TO SUCCESSFUL SOIL FUMIGATION

- Soil Preparation
- Soil Temperature
- Soil Moisture
- Fumigant
- Injection Depth

KEYS TO SUCCESSFUL SOIL FUMIGATION

- Soil Preparation
- Soil Temperature
- Soil Moisture
- Fumigant
- Injection Depth
- Sealing

KEYS TO SUCCESSFUL SOIL FUMIGATION

- Soil Preparation
- Soil Temperature
- Soil Moisture
- Fumigant
- Injection Depth
- Sealing
- Soil Aeration

KEYS TO SUCCESSFUL SOIL FUMIGATION

- Soil Preparation
- Soil Temperature
- Soil Moisture
- Fumigant
- Injection Depth
- Sealing
- Soil Aeration
- Waiting Period

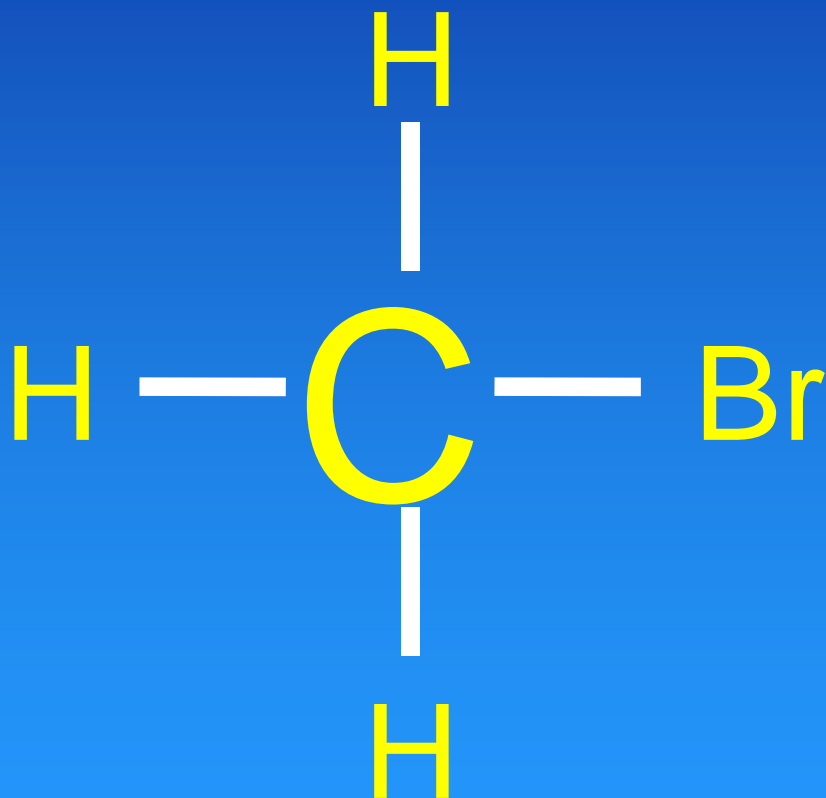
FUMIGATION SAFETY

- **Characteristics of Methyl Bromide and Chloropicrin**
- **Potential Hazards**
- **Prevention / Protection**
- **First Aid / Emergency Response**

METHYL BROMIDE

- Naturally occurring molecule
- Non-flammable
- Boils at 38.5 degrees F
- 3.27 times heavier than air
- Practically insoluble
- Odorless and Colorless

METHYL BROMIDE



METHYL BROMIDE TOXICITY

RESPIRATORY TRACT

- **Symptoms: Dizziness, Headache, Nausea, and Vomiting**
- **Lung Edema**
- **Cardiac Irregularities**
- **Possible Death**
- **Symptoms Can Be Delayed**

DANGER

This product contains CHLOROPICRIN as a warning odorant. Chloropicrin may be irritating to the upper respiratory tract, and may cause painful irritation to the eyes, producing watering. If the symptoms occur, leave the fumigation area immediately.

CHLOROPICRIN

- Lachrymator
- 5.7 times heavier than air
- Colorless
- Respiratory Irritant
- TLV-0.1 ppm
- Liquid

USE THE CORRECT FUMIGANT

98-2

CHLOROPICRIN 50

75-25

???

80-20

CHLOROPICRIN 100

67-33

SAFETY MEASURES TO AVOID RESPIRATORY INJURY

- Begin Application on the Downwind Side of Field
- Pressure Check All Plumbing on Tractor With Nitrogen
- Repair Any Rips or Holes in Plastic Promptly
- Never Install Fumigation Plumbing Inside Enclosed Tractor Cab
- Replace Worn Chisels

PRACTICAL TREATMENT

- IF INHALED
Fresh Air - Stay Warm - Artificial Respiration
- IF ON SKIN
Remove Clothing - Wash With Soap and Water
- IF IN EYES
Flush At Least 15 Minutes With Water

**Go to a doctor or emergency treatment facility
as soon as possible!**

Methyl Bromide and Chloropicrin REDs

July 9, 2008

“Incidents for the soil fumigants generally occur at a low frequency relative to the total number of fumigant applications performed annually. “

Risk Mitigation: Economics

“The trade off to growers, however, will be some combination of more trips to fumigate the field, use of more expensive high barrier film, delays in planting due to longer fumigation operations, and more trips to the field for planting and other operations if fumigating in smaller blocks results in staggered operations. Some of these costs could be substantial.”

Biological and Economic Analysis Division (BEAD) EPA,
June 24, 2008

Effect of Buffer Zones



Risk Mitigation: What needs to be done?

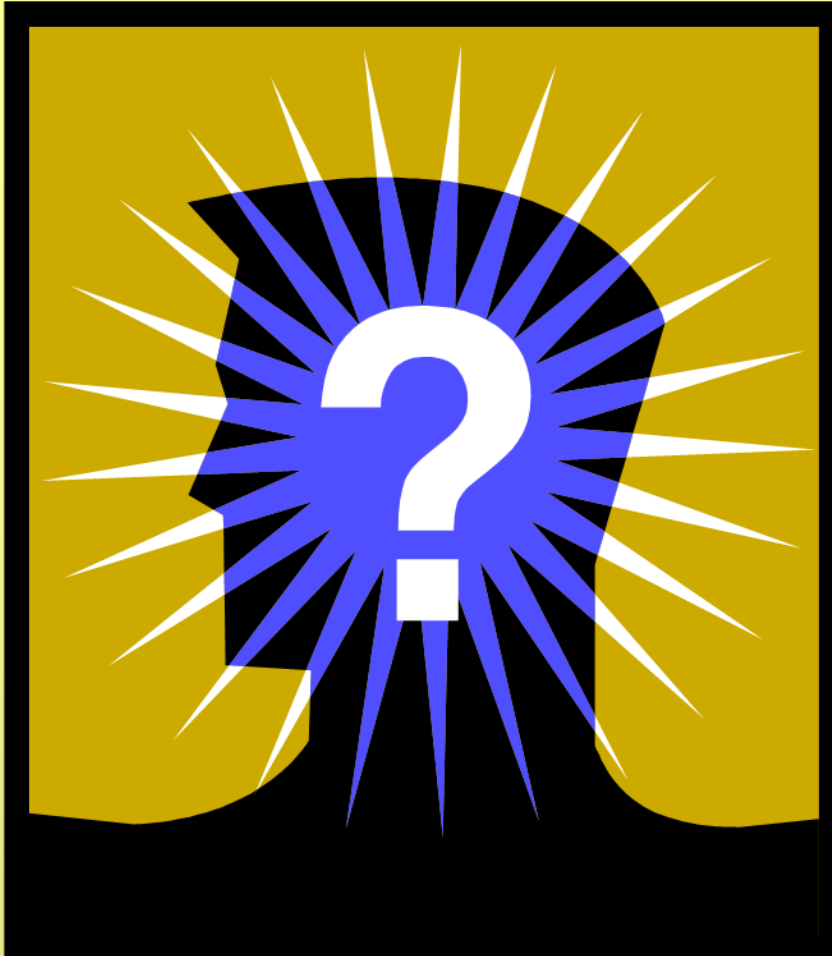
- **Mitigation Rules are Final.**
- **Comment Period – ‘implementation of rules’**
- **Only Congress can affect EPA**
- **Outline the economic & dollar effects of these Mitigation Rules on the production of your crops and business.**
- **Contact: Senators, Representatives, Commissioner of Ag, Governor, USDA**
- **Contact Steve Johnson, EPA and Comment to him, the docket, and Congress**

FINAL POINTS

- **EPA must balance risk with benefits**
- **Soil fumigants provide great benefits with a history of low risk of occupational or bystander exposure as pointed out by EPA in the RED**
- **Unfunded Mandate to State Department of Agriculture for Compliance**
- **New cost to Registrants to develop, implement, and conduct training programs**
- **Environmental factors not taken into account (Fumigation Window)**
- **The complication, cost, scheduling, notification, FMP, written permission from adjacent landowners or right-of-way administrators, evacuation of houses, respiratory protection, and especially Community Outreach will eliminate soil fumigation by growers and drive domestic fruit and vegetable production offshore.**
- **Food safety will become a major issue.**

What can you do?

- Write an e-mail to the EPA Administrator asking that the EPA withdraw the Soil Fumigant RED because it is not a workable solution and began an outreach to Growers, Registrants, Fumigators, Depts. of Ag, and University Researchers for the good of our nation. Explain how this will affect your “family farm” and community.
- Phone EPA.
- Copy FDACS, USDA, Congressmen, Fla Farm Bureau
- Phone each of the above
- Comment on the docket and copy everyone via E-mail.
- E-mail your Congressman and Senator and call. Talk to the Ag Aid and let them know the long term implications.



QUESTIONS?