ACHIEVING CONSISTENCY WITH ALTERNATIVES

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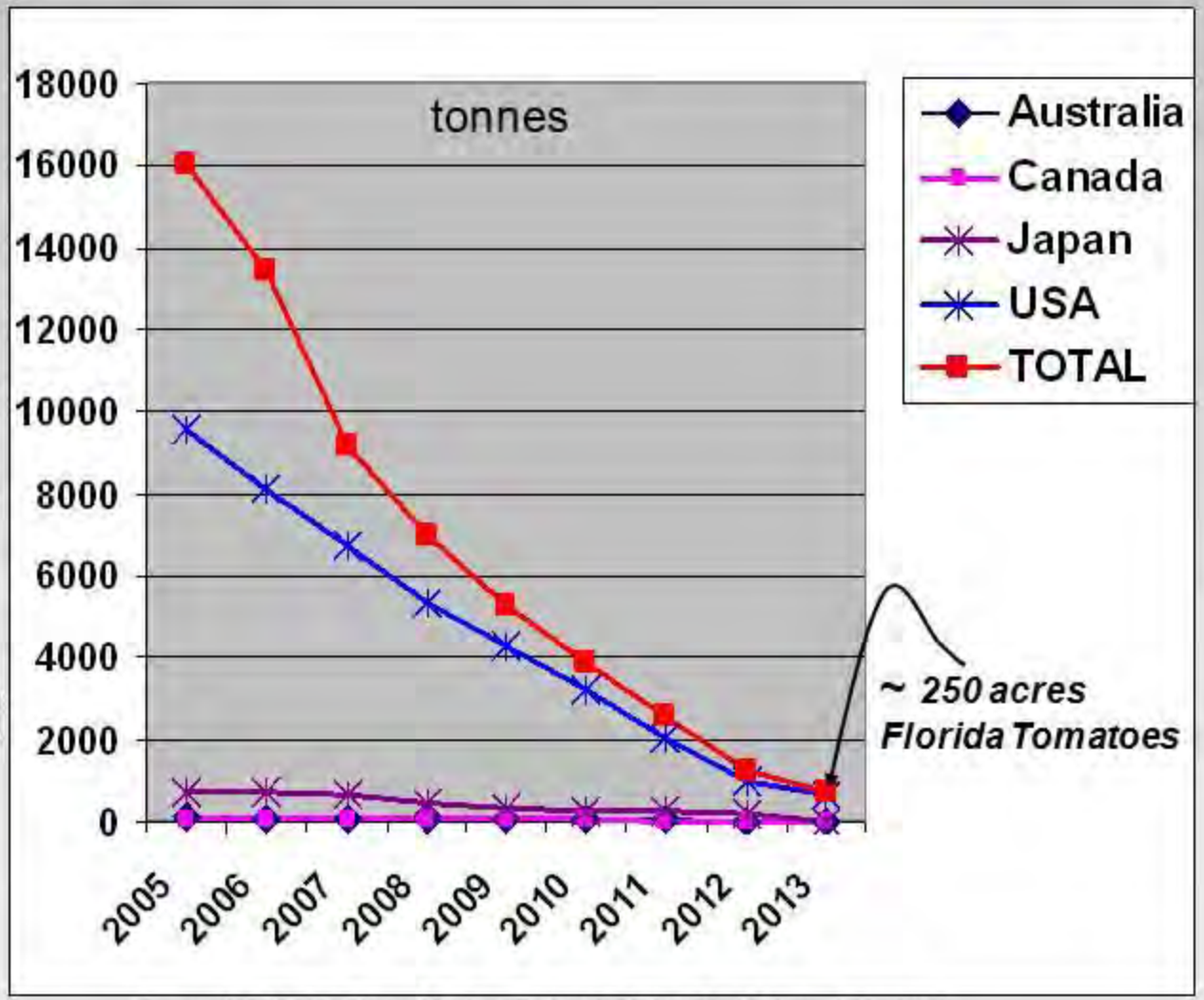
Florida Tomato Institute – Sept 8, 2011 Naples, FL

Many Thanks to Growers who allowed us access to their fields and for the time and resources committed

Trends in Total Amount (t) of MB Approved or Newly Nominated for Critical Uses (2005 – 2013)

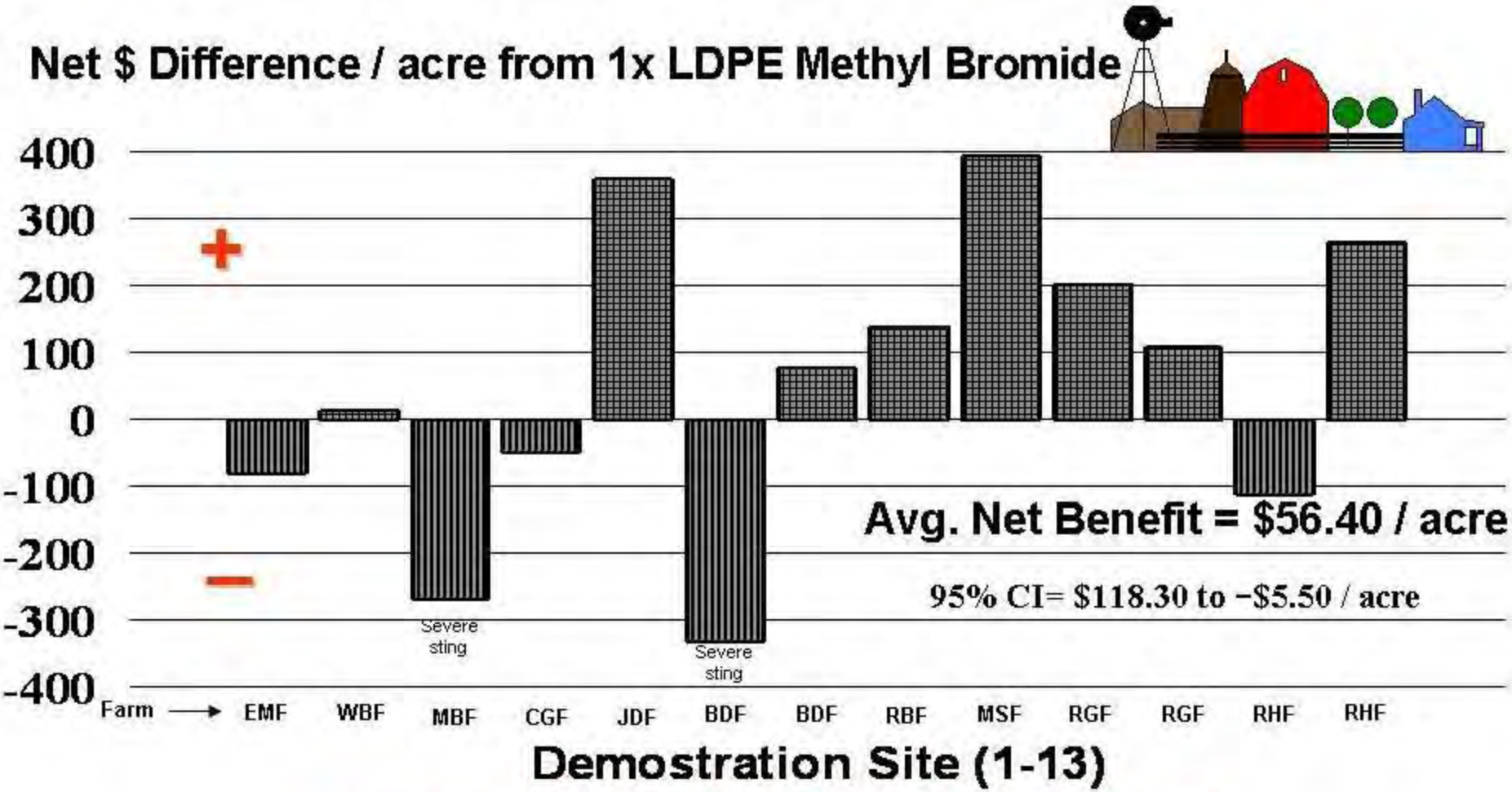
Overall, CUNs continue to fall.

The EC, Israel, New Zealand and Switzerland have phased out for controlled uses. Japan has ceased all soil CUNs.



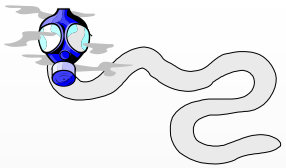
Source: MBTOC CoChairs, Montreal Protocol, OEWG-31, 1-5 August, Montreal

Summary of 13 USDA CSREES sponsored large scale field demonstration conducted Plant City, FL Fall 2006-07, comparing net difference of methyl bromide with alternative system.



Inconsistency can and does occur !

WHAT WILL WE TALK ABOUT ?



Causes of Inconsistency :

- Physical
- Chemical
- Cultural
- *Environmental*

Physical & Chemical Characteristics*

Soil Movement – Behavior in Soil

Full System Approach

Fallow Program Selection

Fallow Weed Management

Summarize Key Concepts

Properties of Soil Fumigants

Fumigant	Boiling Point °C	Vapor Pressure 20° C	Solubility In Water	Soil Half Life
Methyl Bromide	4	1420	13400	12-22
Iodomethane	42	400	12400	4- 40
Chloropicrin	112	18	2270	1-2
1, 3-D	120	28	2250	3-5
Metam Sodium	112	0.04	578290	4–5*
Metam Potassium	114	24	complete	4-5*
Dimethyl Disulfide	110	28.7	3000	?

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- Boiling point is the temperature in which molecules anywhere in the liquid are forming vapor / gaseous molecules and are escaping the liquid
- Vapor pressure is a measure of the tendency of a fumigant compound to change into the gaseous or vapor state. Compounds with high values tend to readily flash from liquid to gas phase and readily / rapidly diffuse through soil.

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They require higher temperature and volitalize to gases much more slowly, and then move thru soil much slower than MBr

Additional Planning & Aeration Time is Required to Account just for Chemical Differences between Fumigants

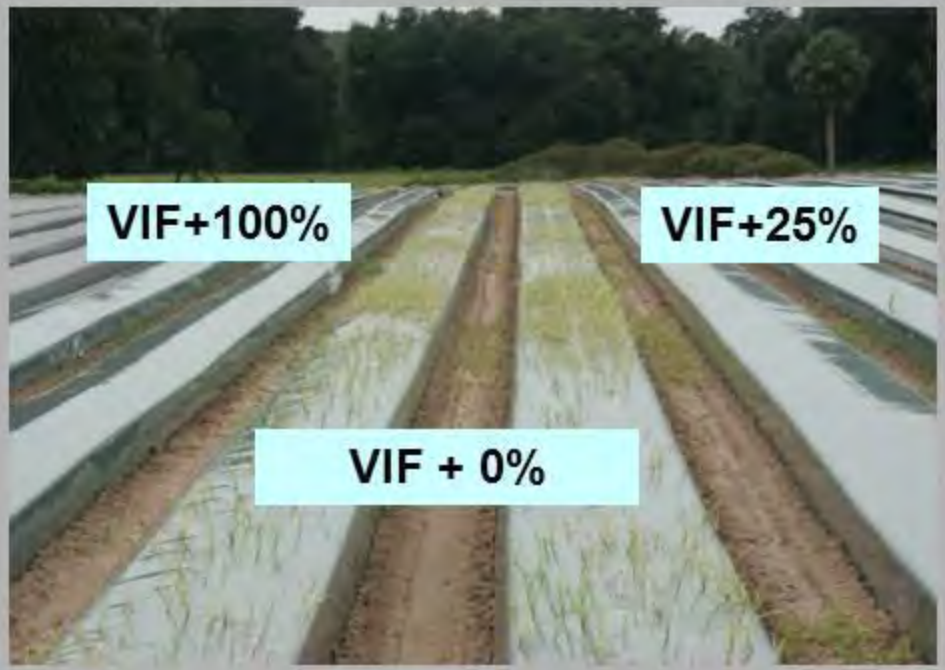
INTEGRATING HIGH BARRIER MULCH TECHNOLOGY

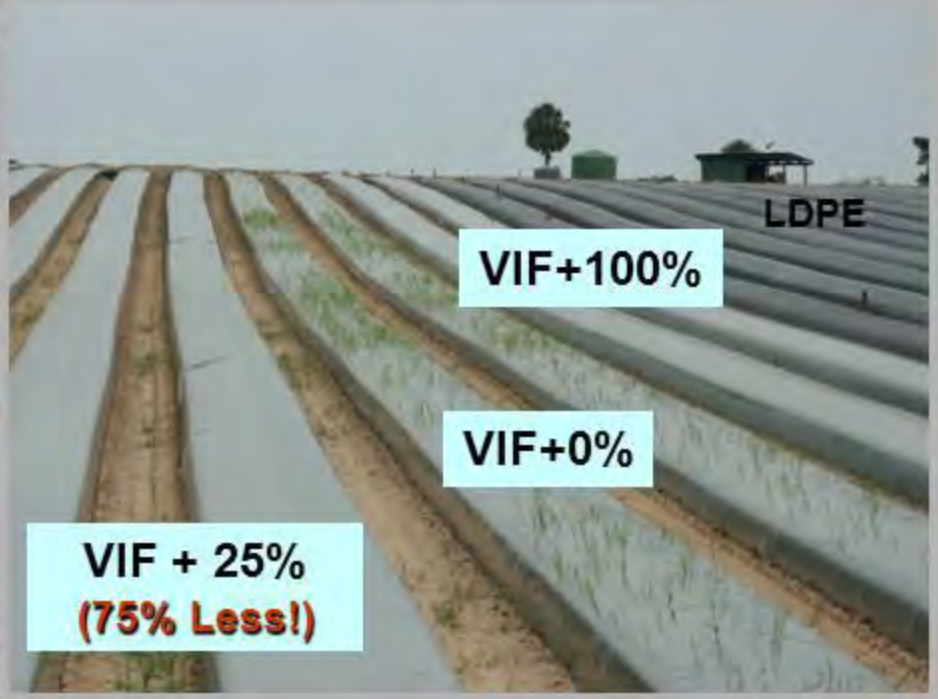
OVER 50 STUDIES SHOW:

- **That they Work**
- **Rates can be reduced**

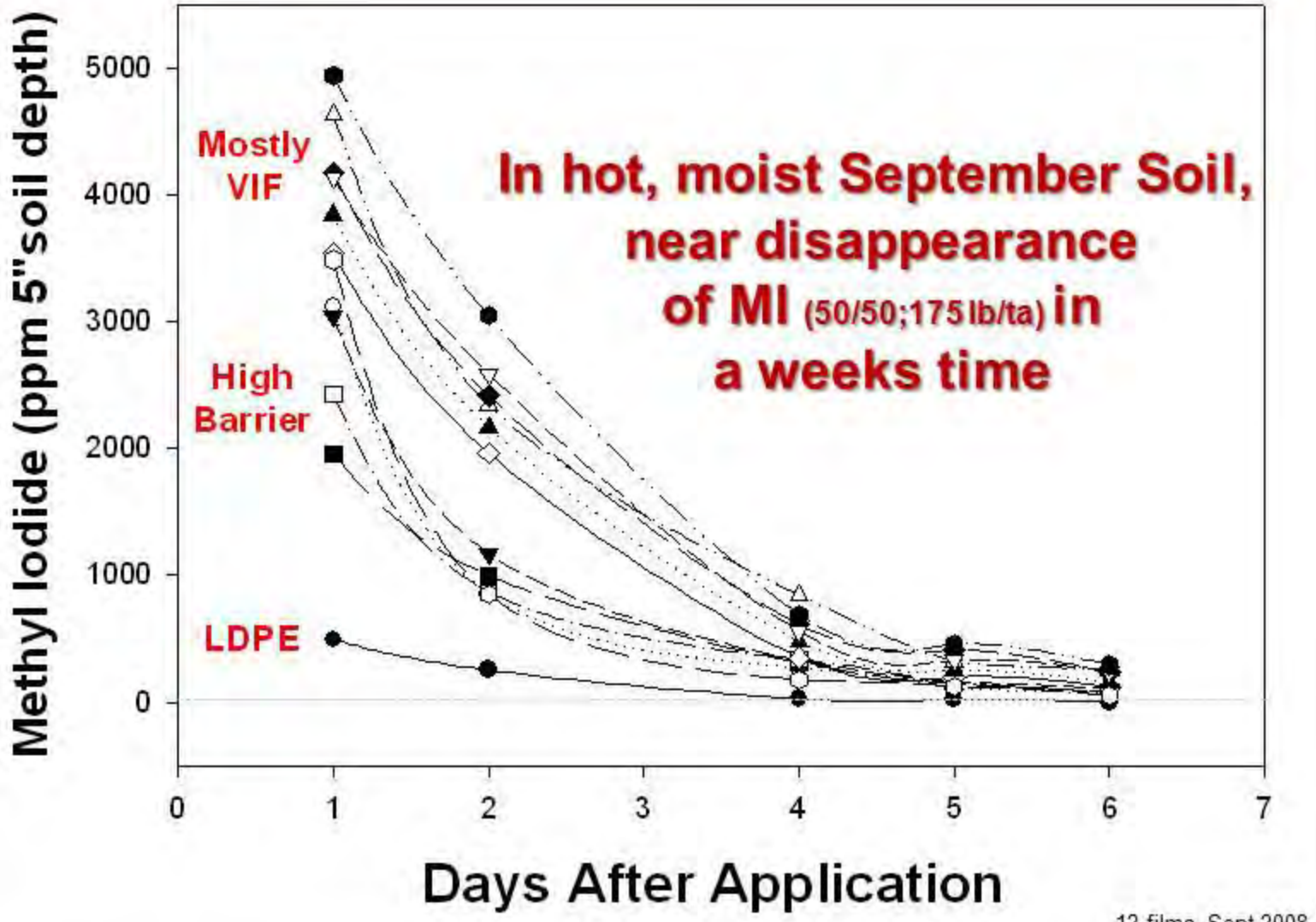
But they can

- **Prolong Dissipation**





ESTIMATED IMPACT of ENVIRONMENT (Temp° , Moisture, Mulch) on the PERSISTANCE of FUMIGANTS IN BEDDED SOIL



12 films, Sept 2008

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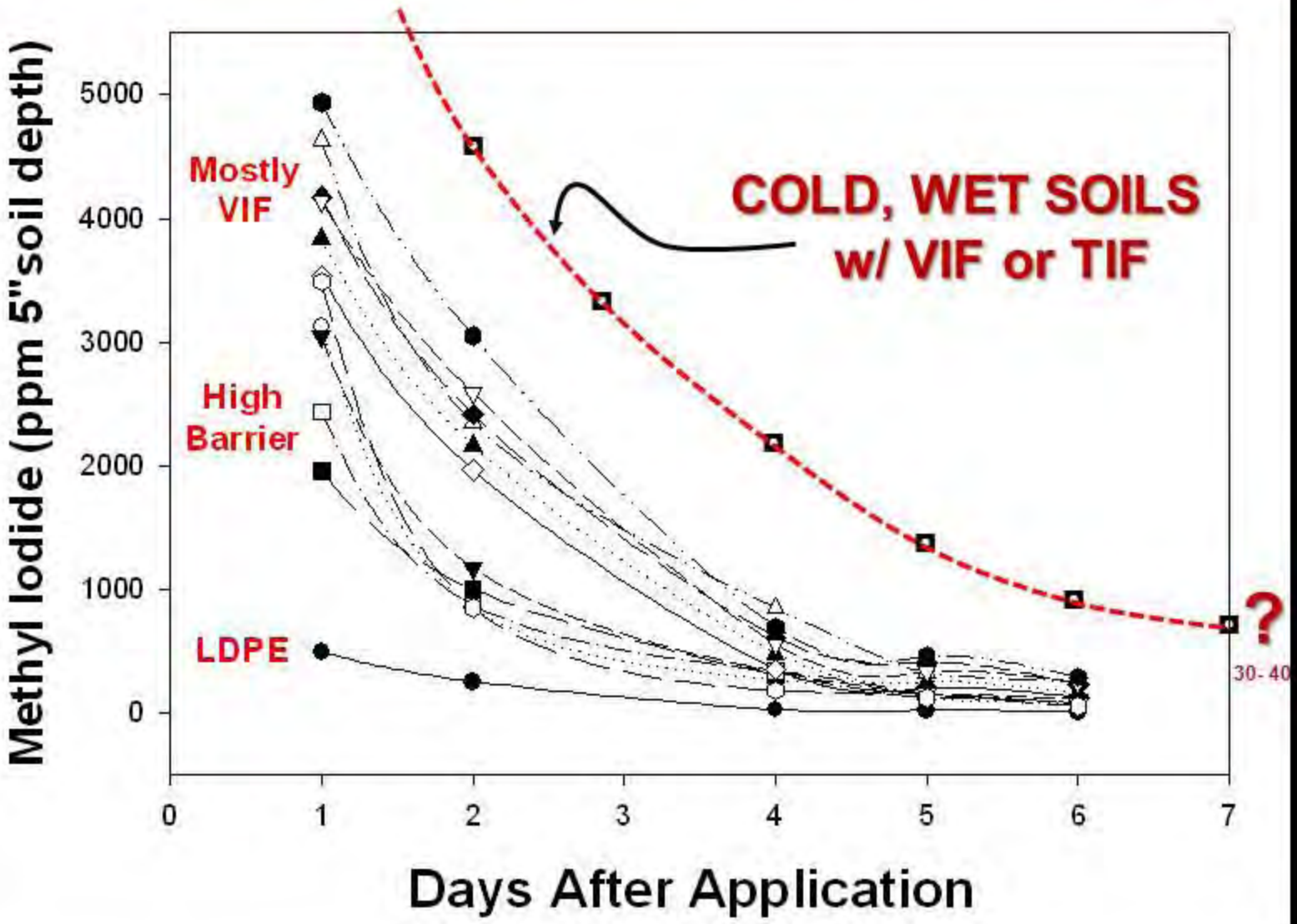
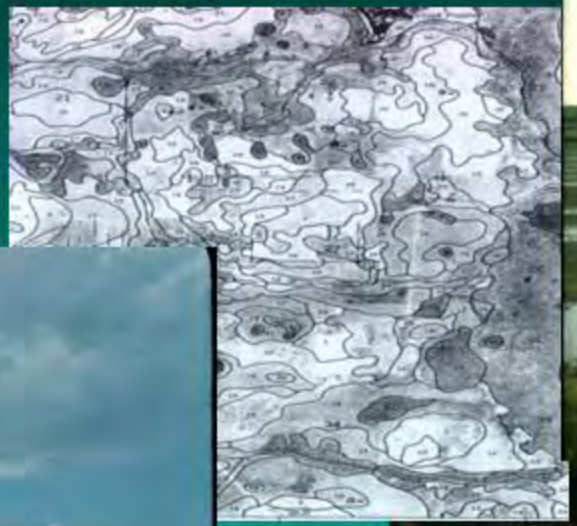


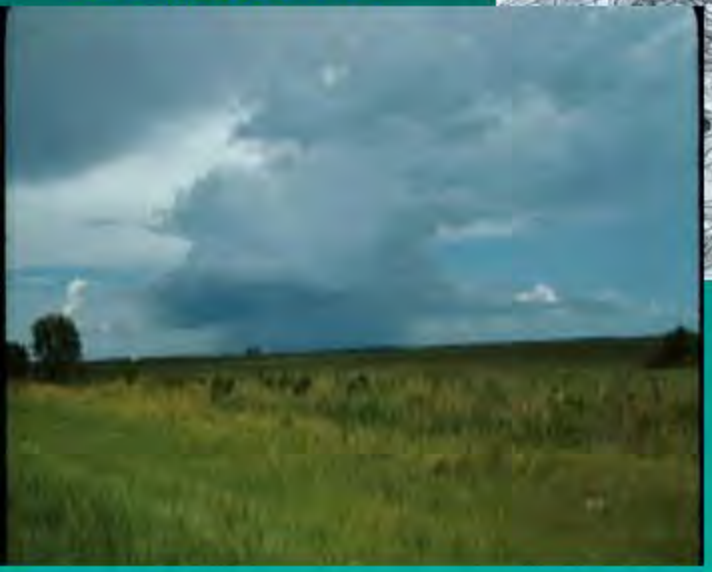
Additional
Planning & Aeration Time
is Required to Account just
for a Gas Impermeable Mulch
covering the Fumigant

The Role of the Environment:

EDAPHIC

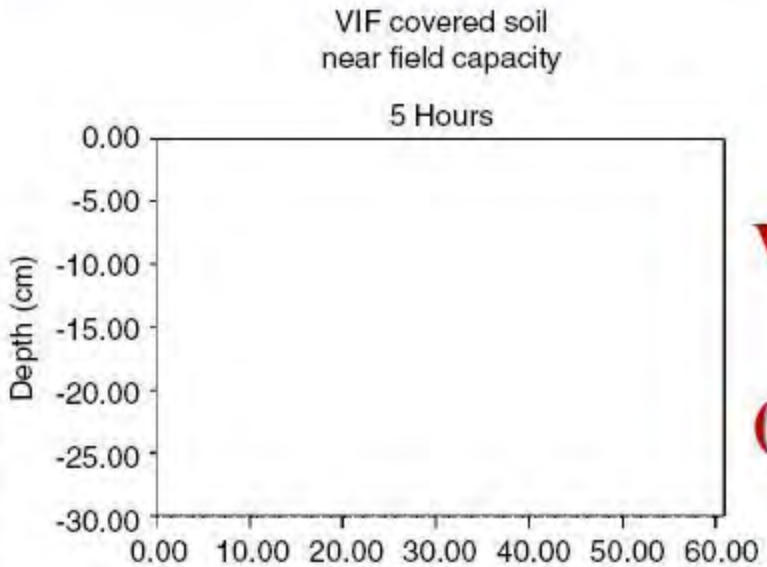


CLIMATIC



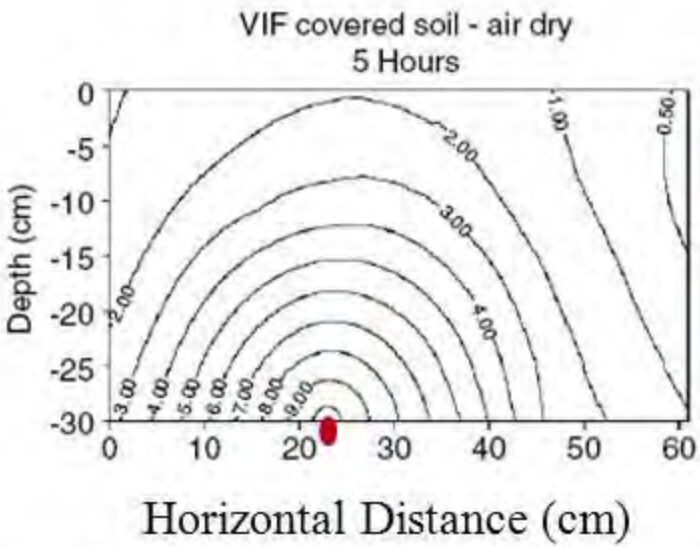
New Fumigants require longer periods for Soil Dissipation under cold, wet conditions!

The importance of open passages to diffusion of fumigants in Soil



VIF covered soil (maintained) at Near Field Capacity (air passages blocked, little movement)

Vertical Distance



VIF covered soil (maintained) at AIR DRY Condition (little impediment to movement)

Contour lines of 1,3-D Concentration in soil profile

Thomas etal., 2003

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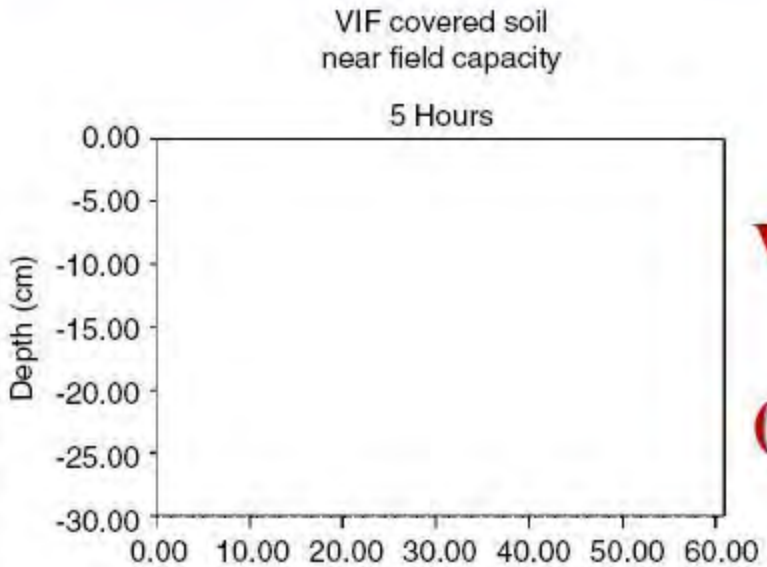

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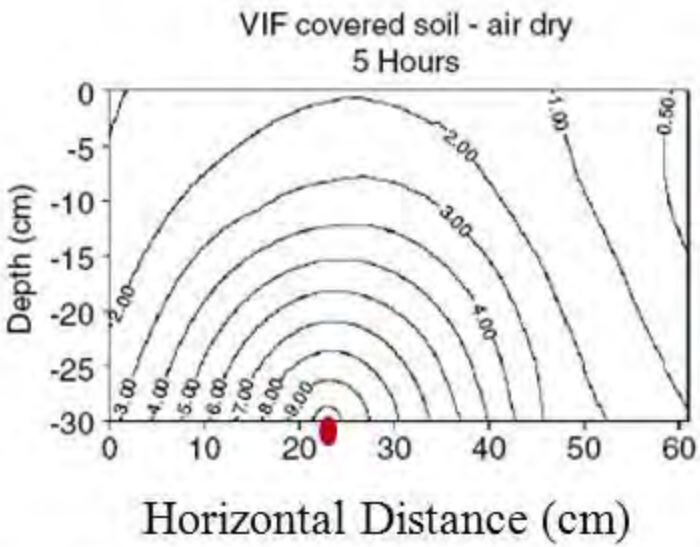

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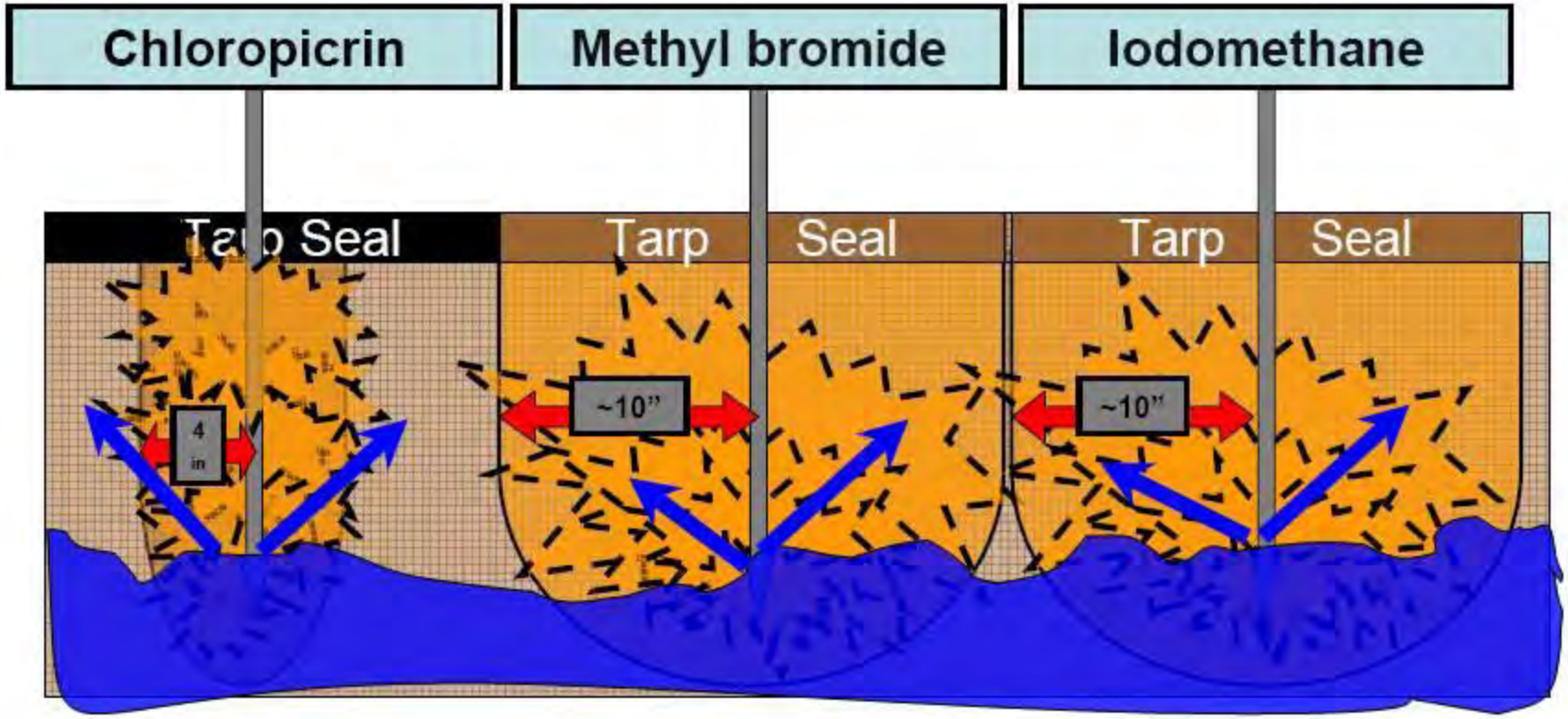
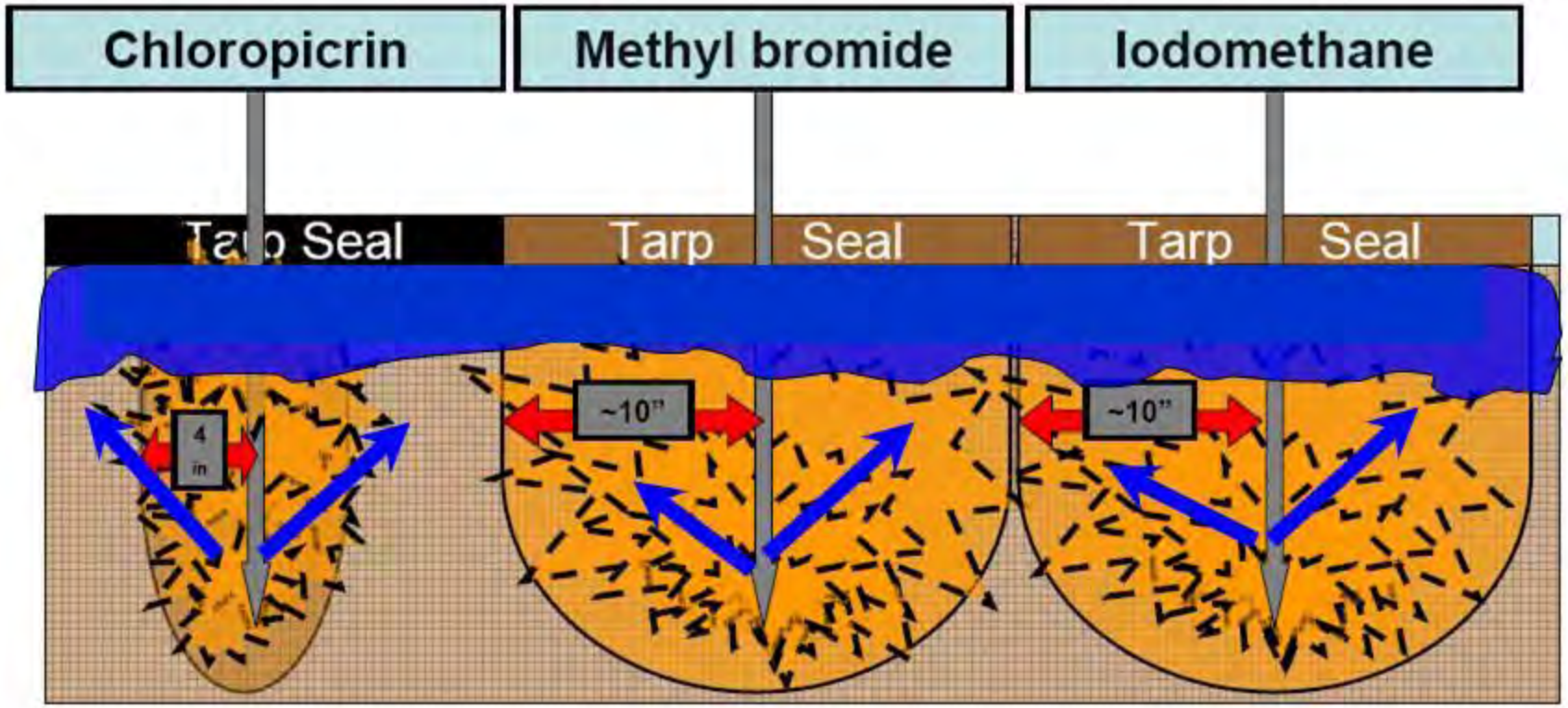
Impact of Water on Fumigant Movement



Water Saturated Soil Horizons effectively block soil fumigant penetration into, thru, or if applied into, Volitalization from the saturated horizon

Modified From Ajwa etal.,2006

Impact of Irrigation Water on Movement of Shank applied Fumigants

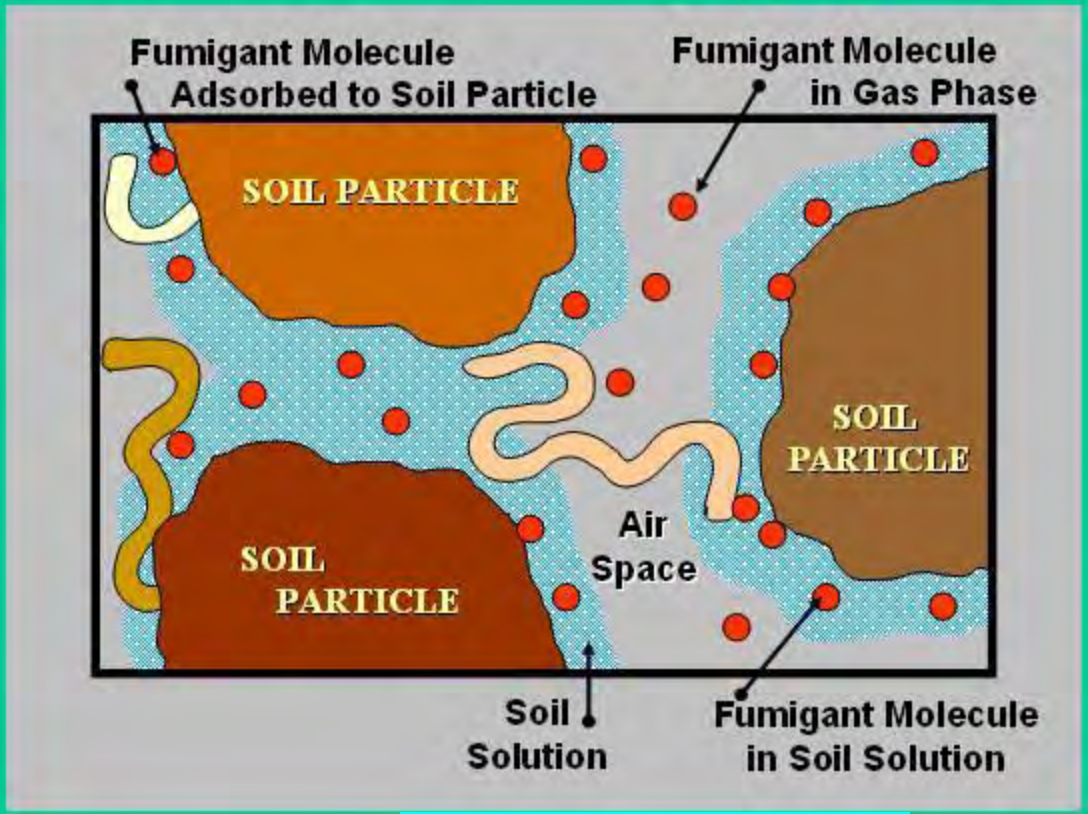


Block Air Passages Provide Effective Containment – Prolonged Aeration

SUMMARY

- **Many factors effect fumigant Dissipation from soil :**

Physical
Chemical
Cultural
Environmental



4 - 6 weeks

All Have to be Planned and Accounted for !

Production = Full System Approach

- Preplant preparation
  - Herbicides/cultivation
- Fumigation
  - Select fumigant and plastic mulch based on known field history
- Herbicides
  - Preplant, under mulch, postemergence, row middles
- Post production burn-off
- Fallow season programs
  - Cover crop or stale seedbed technique

Fallow Programs

- Do not allow fields to sit after harvest!
- 1st application – Gramoxone/Firewall
  - burns down existing foliage but it does not clean up a field
  - Yellow and purple nutsedge, goosegrass, purslane, etc. continue to grow
- 2nd application - glyphosate plus carfentrazone
  - for control of nutsedge and difficult to control broadleaf weeds

Fallow Program Selection

- Integrated Pest Management
  - Cover crops vs. Fallow weed management program
  - Weedy fallow is not an option

- What is your major pest problem
  - Nematodes and/or disease – cover crop
  - Weeds – fallow weed management program

Fallow Weed Management

- Cultivation only
  - Controls annual grass and broadleaf weeds
  - May spread perennial weeds while providing little control
- Herbicide only
  - Controls weeds that will emerge with little disturbance to soil

Fallow Weed Management Programs

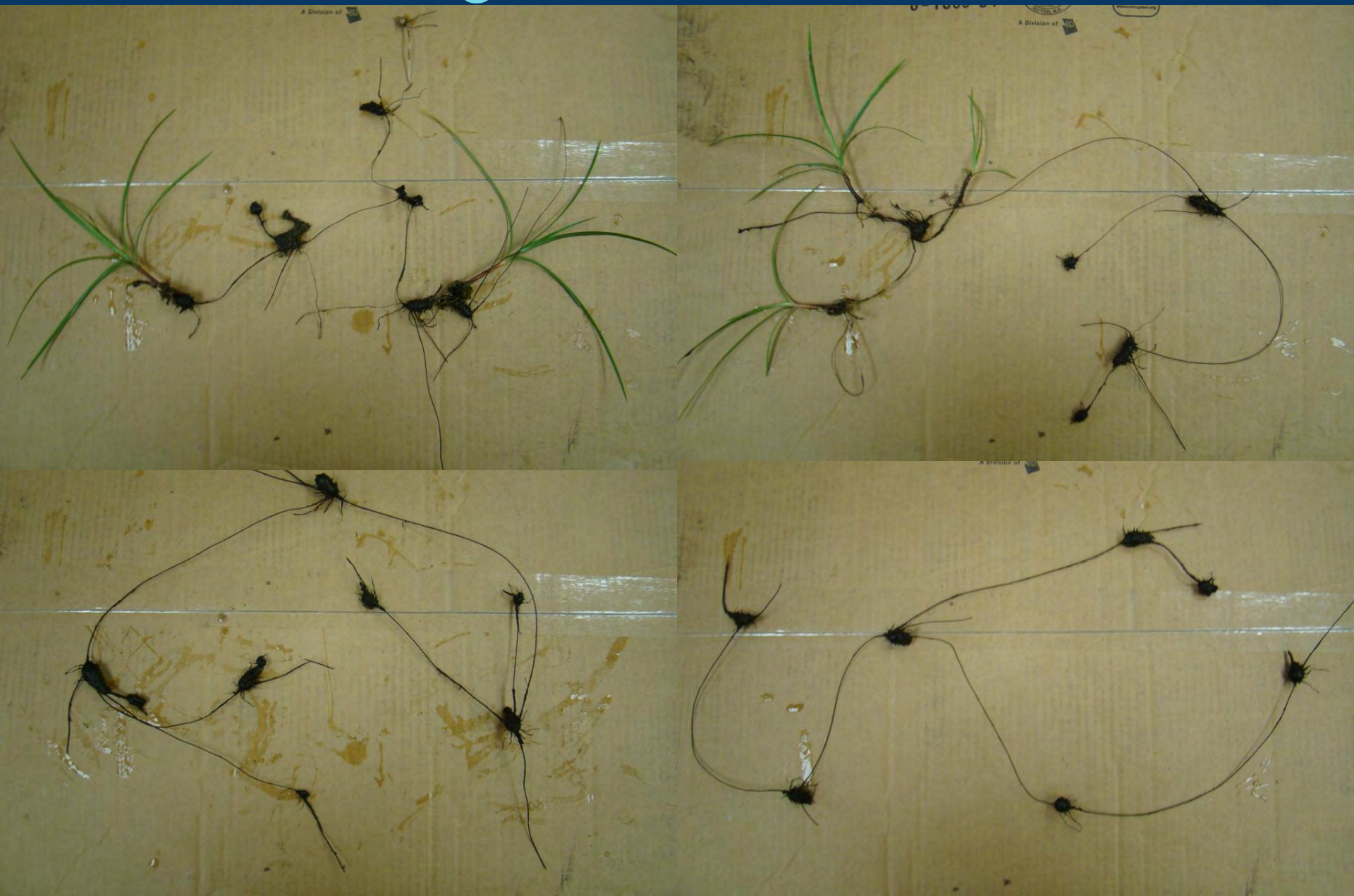
Cultural Control of Nutsedge

- Yellow and Purple nutsedge
  - underground reproduction by rhizomes and chains of tubers
- Cultivation ➡ break nutsedge tuber chain
- Glyphosate ➡ systemic POST emergent herbicide
- Cultivation (break the chain of tubers) followed by glyphosate (kills the tuber that the sprout is growing from)

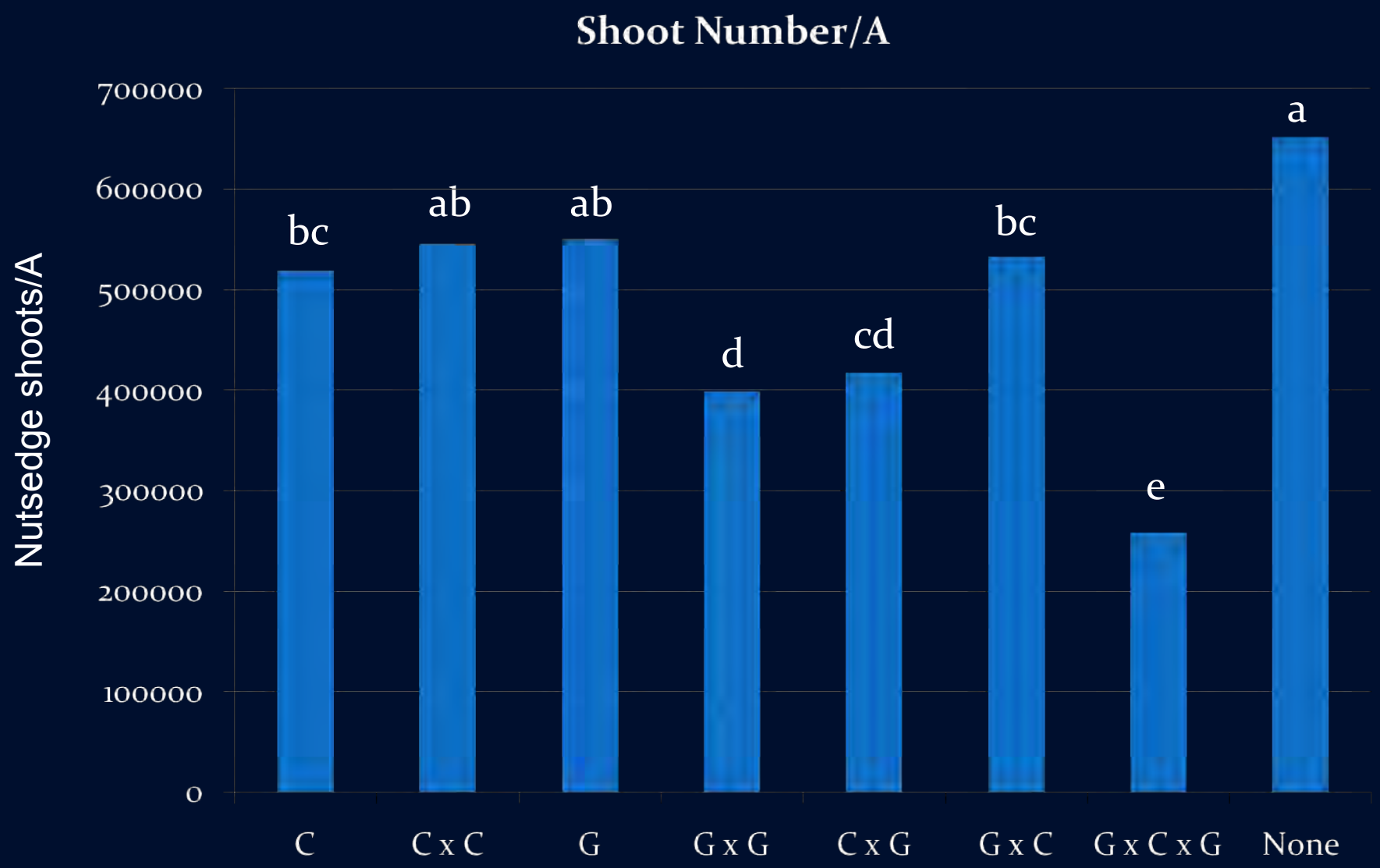
Whitefly Management

- Cover crops
  - May allow for increase in whitefly population
  - Should not be a host for whitefly transmitted diseases
- Fallow weed management program
  - If timely, should help reduce whitefly populations
  - If timely, should reduce whitefly transmitted diseases
- Weedy fallow
  - Will provide a place for whiteflies to breed
  - May possibly be a sink/source for whitefly transmitted diseases

Nutsedge Tuber Production

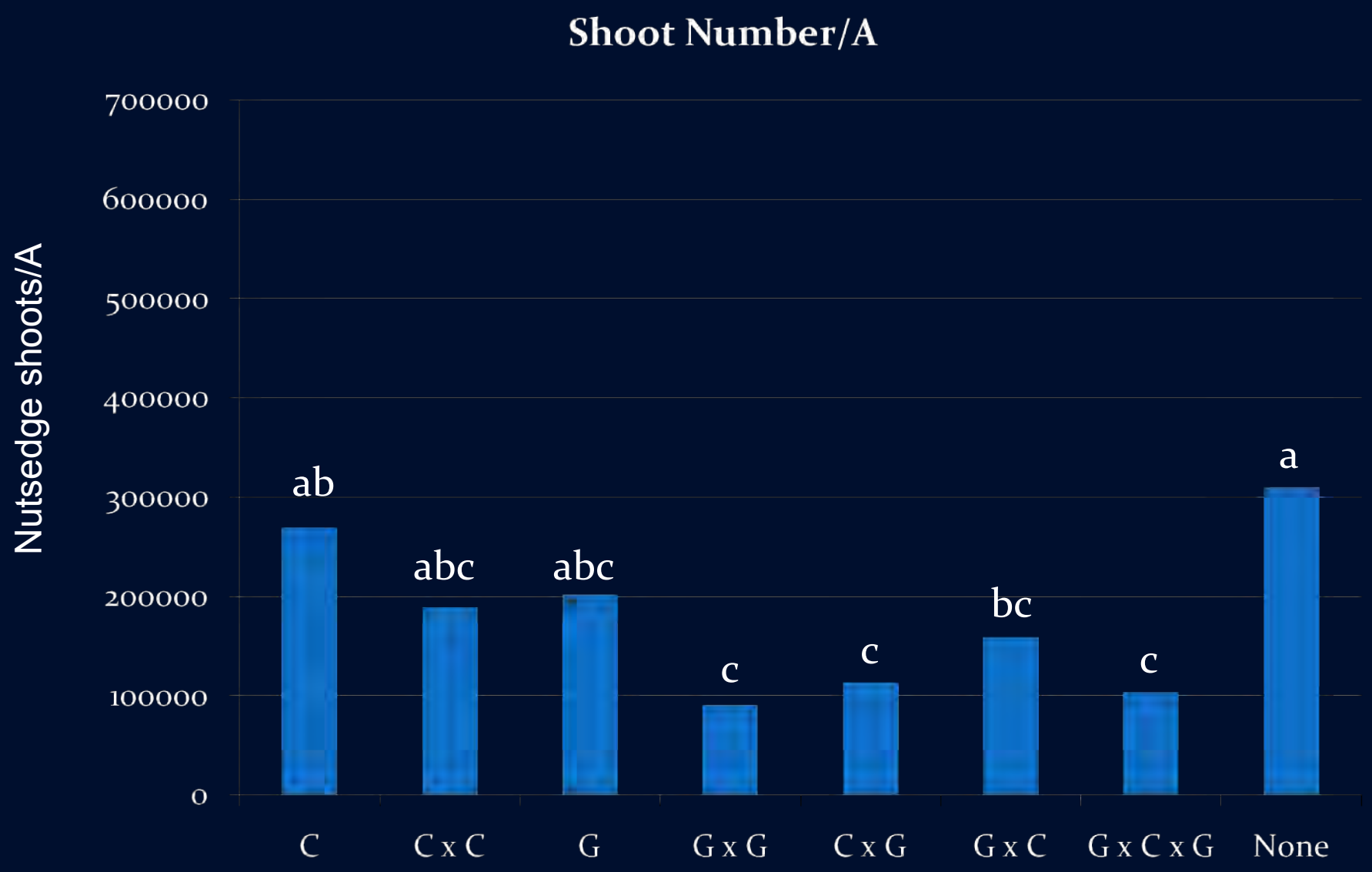


Nutsedge count 28 days after no fumigation



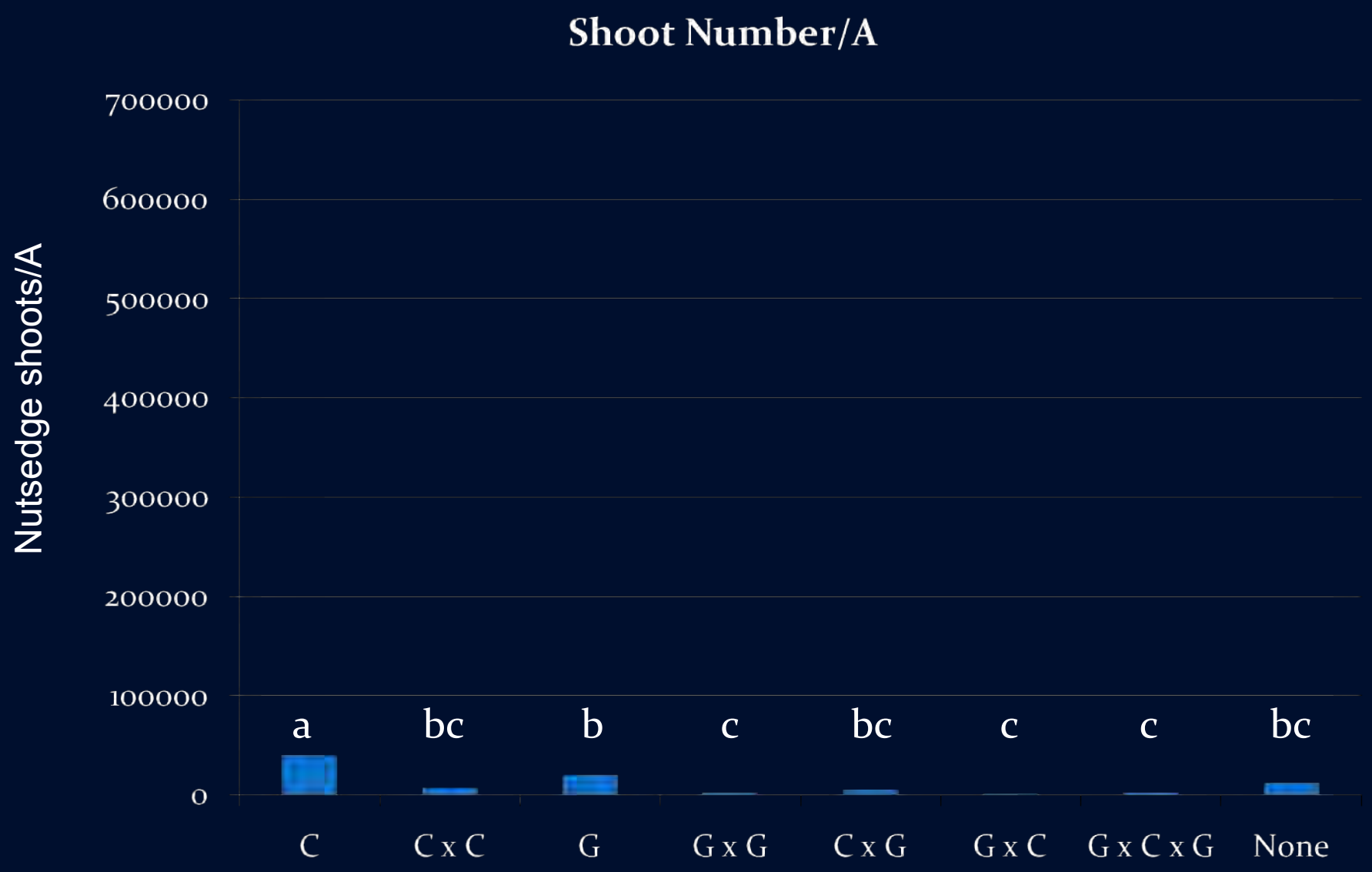
C = cultivation, x = followed by, G = glyphosate

Nutsedge count 28 days after PicClor 60 fumigation



C = cultivation, x = followed by, G = glyphosate

Nutsedge count 28 days after Paladin Pic fumigation



C = cultivation, x = followed by, G = glyphosate

14 Days After Application

Non-treated Control

Paladin Pic at 50 gal/treated acre

PicClor-60 at 250 lbs/treated acre

12 Month Pest Control Program

- Keep your fields clean
  - Pests will take refuge on weeds in row middles and field edges
- Know your fields
  - Use different programs for different fields
- Tailor your off-season programs to target your pests
- If you are having problems with virus
  - Check field edges/old fields

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Questions?