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Sustainability of Methyl bromide Alternative Fumigants and New Labels from Phase II Reregistration of Soil Fumigants

Joseph W. Noling[1] and Andrew MacRae[2]

[1] Professor, University of Florida, IFAS, CREC, Lake Alfred, FL

[2] former Assistant Professor, University of Florida, IFAS, GCREC, Balm, FL

2012 Tomato Institute – Naples, FL

EPA Reregistration of Soil Fumigants

Will Complete Phase II Dec 2012

- chloropicrin
- dazomet
- metam sodium
- metam potassium
- methyl bromide
- methyl iodide

All require Phase II labeling changes Effective Late 2012 to include new Buffer zones, FMP, PAS, GAP's, & Additional Worker Applicator Training

NEW PRODUCT LABELS – Phase II

Risk Mitigation Measure	2011	2012
Good agricultural practices (GAPs)	•	•
Restricted use (new measure for metam sodium/ potassium & dazomet only)	•	•
New handler protections including changes to respiratory protection, tarp cutting/removal and worker reentry restrictions	•	•
Fumigant management plans and post application summaries	•/▣	•
Buffer zone distances, credits, and posting		•
Emergency preparedness measures		•
Difficult to evacuate sites		•
Notice to state lead agencies		•
Safe handling information	•	•
First responder, community outreach and certified applicator training	▣	•
Rate reductions and use site limitations	•	•

Coming Soon !

Buffer Zones, Credits, Posting

Emergency Preparedness

Difficult to Evacuate Sites

Certified Applicator Training

General Information Section

Required late 2012 With New Labels

FUMIGANT MANAGEMENT PLAN

Certified Applicator Supervising the Fumigation		
Name and phone number:	License number:	☐ Commercial applicator ☐ Private applicator
Employer name and address:		Date of completing registrant training program: Product(s) Stewardship Training Date(s)
General Site Information		

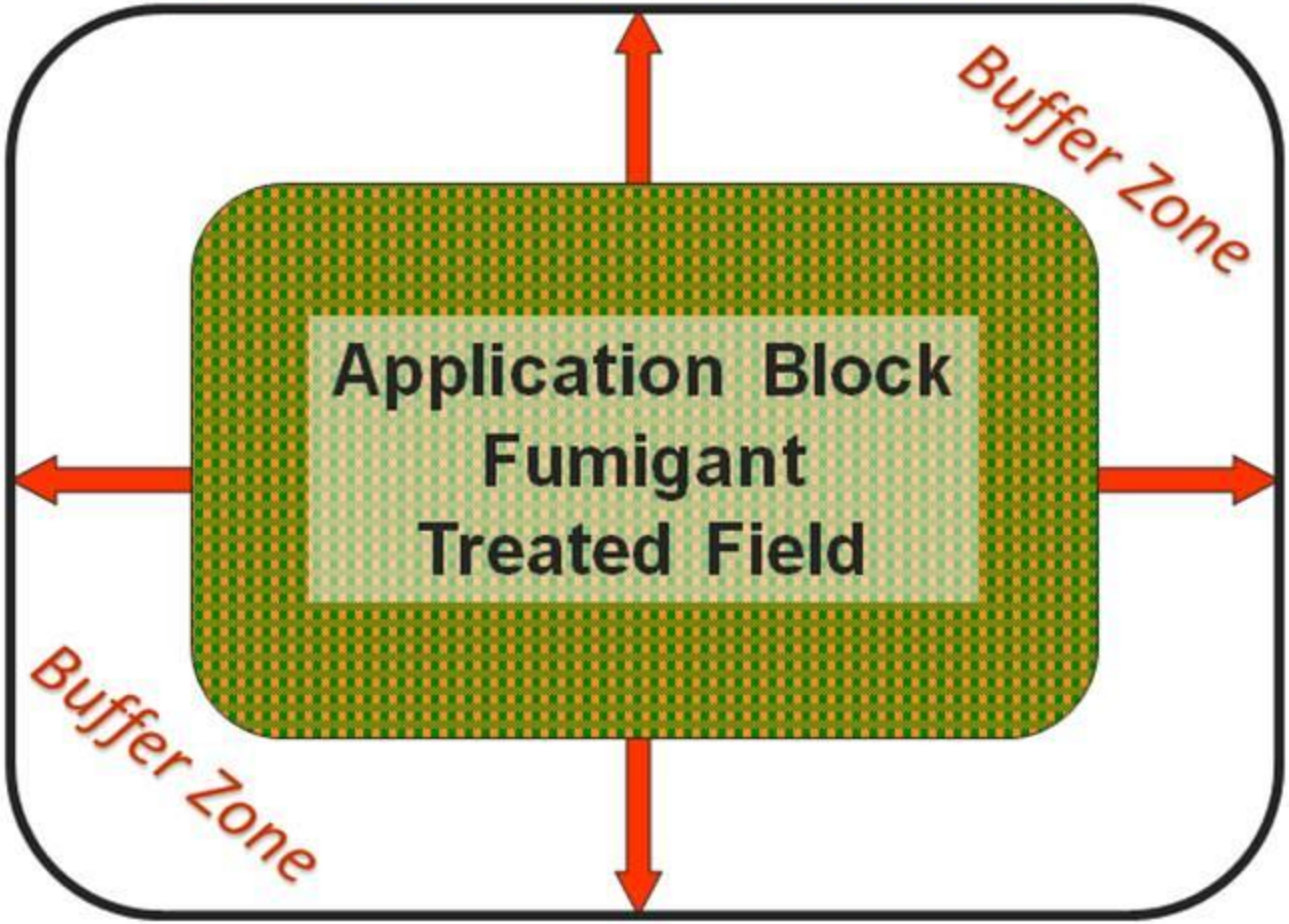
Additional Applicator Training coming late 2012

To complete the Fumigant Management Plan, the certified applicator must document that training developed and provided by individual fumigant registrants is completed every 12 to 36 months depending on fumigant used (Currently an annual requirement for all DMDS and Methyl iodide fumigant products).

Buffer Zones

Coming Soon !

A Buffer Zone is the area surrounding the application block, extending outward in all directions from the treated field, a specified distance, where workers or bystanders must be excluded during the buffer zone period, except for people in transit.



Required late 2012 With New Labels

Fumigant Management Plan Site Map

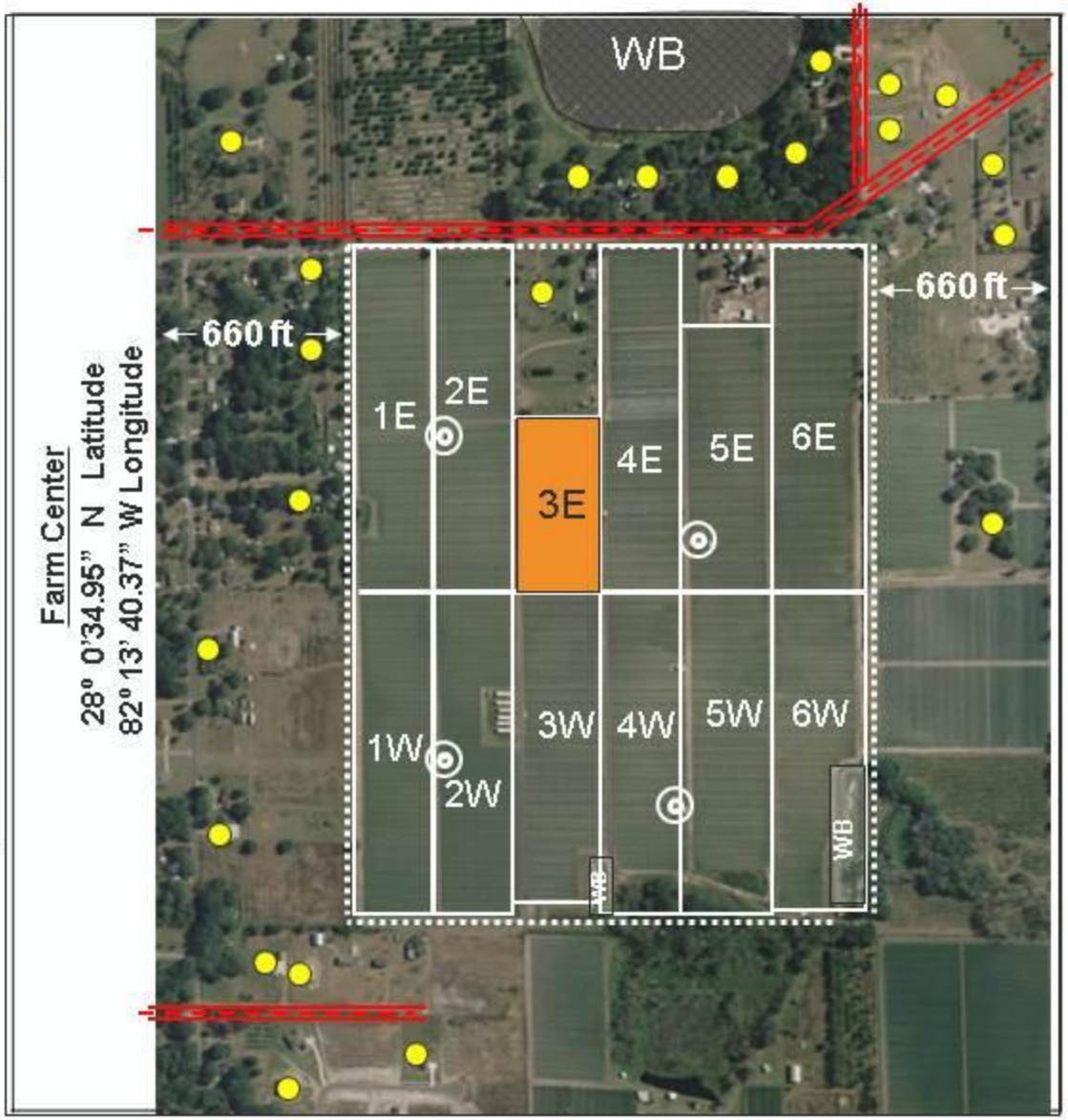
Detailing the:

- Application Block
- Buffer Zone perimeter
- Property Lines
- Roads, Rights of Way
- Bus stops, walkways
- Difficult to Evacuate Sites
- Nearby Application Blocks

Map extends
660 feet from property line to
Confirm proximities of
'Hard to Evacuate Structures'

Site Map

Location of application block: xxxx Moores Lake Rd, Dover, FL- **Block 3E**



Required Late 2012 with New Labels and Buffer Zones…

Fumigant Management Plan:

Site Specific Response & Management

Notification of Neighbors

Site Specific Response and Management	☐ Fumigation Site Monitoring or ☐ Response Information for Neighbors	
If Response Information for Neighbors has been selected, completed the following:		
If buffer zone is 25-100 ft:	☐ Neighbors within 50 ft of buffer zone	☐ No neighbors within 50 ft of buffer zone
If buffer zone is 100-200 ft:	☐ Neighbors within 100 ft of buffer zone	☐ No neighbors within 100 ft of buffer zone
If buffer zone is 200-300 ft:	☐ Neighbors within 200 ft of buffer zone	☐ No neighbors within 200 ft of buffer zone
If buffer zone is > 300 ft:	☐ Neighbors within 300 ft of buffer zone	☐ No neighbors within 300 ft of buffer zone
If buffer zones overlap	☐ Neighbors within 300 ft of buffer zone	☐ No neighbors within 300 ft of buffer zone

List of residences and businesses informed (neighboring property owners):

The FMP in late 2012 will also require information regarding the proximity of fumigant treated fields relative to neighbors living within specified distances of the buffer zone and for other "Difficult to Evacuate Sites" such as schools, clinics, day care centers, hospitals, or prisons.

Method used to provide information:

Information will be communicated by mail, email, telephone, door hangers, or via direct contact (circle those that apply)

Required Late 2012 with New Labels and Buffer Zones…

Fumigant Management Plan: Air Monitoring Plan

- Buffer Zone Perimeters -

For Buffer Zone Monitoring: (check here if section is not applicable ☐)

Name of handler performing monitoring activities	Handler address	Handler phone number	Location of monitoring	Timing
			Areas between buffer zone perimeter and adjacent houses and businesses	•1hr before sunset •Once during night •1 hr after sunrise •Once during day

Fumigation Site Monitoring

From the beginning of the fumigant application until the buffer zone period expires, a certified applicator or someone under his/her supervision must:

- Monitor for air concentrations of chloropicrin in areas between the buffer zone perimeter and the areas (such as residences and businesses) that trigger this requirement.
- Monitoring the air concentration levels must begin the evening on the day of application and continue until the buffer zone period expires with a minimum of at least 8 samples during the buffer zone period, including these periods:
  - once, 1 hour before sunset,
  - once, during the night,
  - once, at 1 hour after sunrise, and
  - once, during the day.

4 times/day for Duration of Buffer zone

If at any time the person monitoring the air concentrations experiences sensory irritation, then the emergency response plan stated in the FMP must be immediately implemented. If other problems occur, such as a tarp coming loose, then the appropriate control plan must be activated. The location and results of the air monitoring must be recorded in the post-application summary report.

18 year Phase Out Timeline & Development of Alternatives

MeBr Detected atmosphere

Class A Ozone Depleter

Problem Definition Phase
'No Stand Alones'
1994-1996

Emissions Reduction
Nonchemical / Physical
Cultivar evaluations

Comprehensive evaluation
of new fumigant chemistry
Application & VIF technologies
Gas Phase Soil movement

Grower Demo Trialing
Technology Transfer
Transition Strategies

25% 50% 70% 100%

1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2012

1993
Experimental
Advanced Film
Technologies

1994
Methyl
Iodide
Drip 1,3-D

1996
Drip Fumigation

1998
Propylene Oxide
Propargyl Bromide
Ozone
Enzone
New 2005
Phaseout Schedule
Harmonized with
Developed Countries

1999
VIF
MULCH
IR-4 Program

2000
Yetter
Coulter
biofumigation

2001
Sodium Azide
Solarization
Propargyl bromide

2003
DMDS

2005
CUE's
Begin

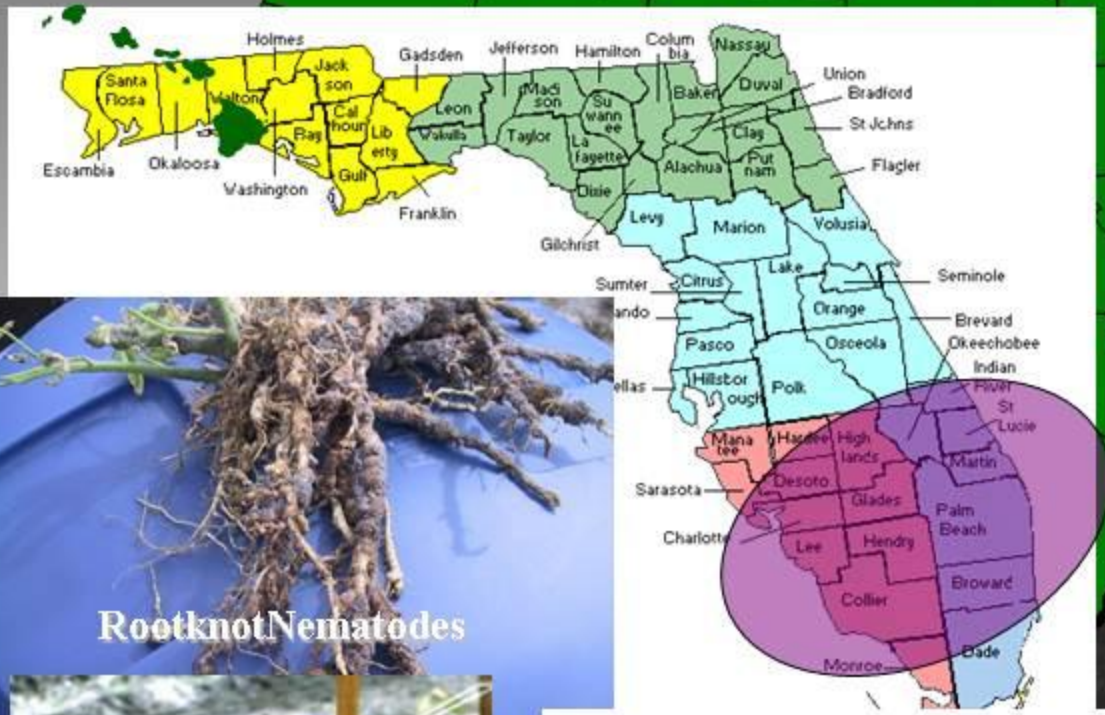
2006
USDA ARS
Areawide

2008
TIF
Mulches

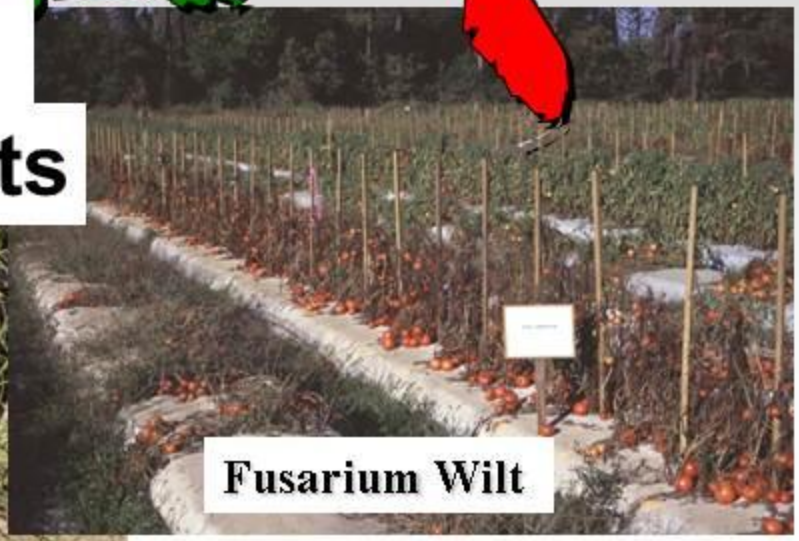
2009
MeBr
Supply
shortages

2012
Completing
the
transition

Southeast U.S. - Florida
Tomato, Eggplant, Pepper



Primary Pests



A simple definition:

And research objective !

Sustainability *of any methyl bromide alternative fumigant system must:*

maintain soilborne pest and disease populations (pressures) at levels equal to or less those occurring in the previous cropping cycle without any negative impact on yield while still being economically viable. (i.e., pest densities cannot increase from one cropping season to the next resulting in decreasing tomato yield)

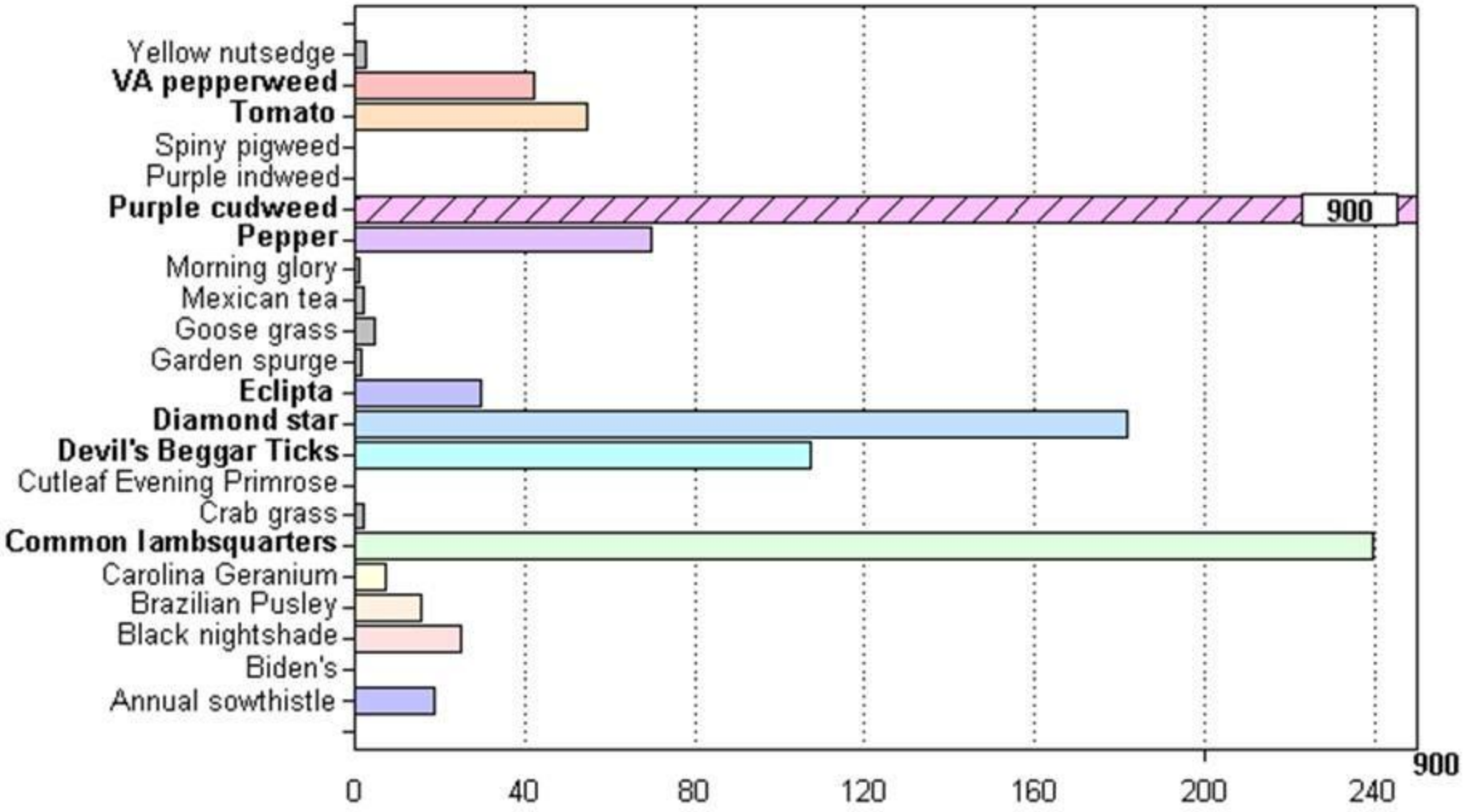
Working Hypothesis:

Weed density and diversity to increase in the Post Methyl Bromide Era

Added Importance of Weed Management

Role and Importance of Weeds as Nematode hosts in commercial production

Weeds Serving as Hosts to the *Meloidogyne incognita* within long term fumigant trial, Balm GCREC, 2008



Egg masses per gram of root tissue

counts reflectage and condition of root system during end of season assessment

LONG TERM FUMIGANT SUSTAINABILITY TRIAL

- Treatments (all rates on a broadcast basis)
  - Non-treated control
  - Methyl Bromide 67:33 (175 lbs/A)
  - Midas 50:50 (160 lbs/A)
  - Paladin Pic 79:21 (60 gal/A)
  - 2-Way = Telone II + Chloropicrin (12 gal + 150 lbs/A)
  - 3-Way = 2-Way + K-Pam (60 gal)
- 4 Year study, presenting years 1 through 3

Tomato IPM Considerations:
Principal Pests-Soil

Disease

Bacterial Wilt
Southern Blight
Fusarium Wilt
Fusarium Crown &Root rot
Verticillium Wilt
Pythium sp.
Rhizoctonia sp.

Nematode

Root-knot
Sting
Reniform
Others

Arthropod

Wireworm
Mole Crickets
Cutworms
Others

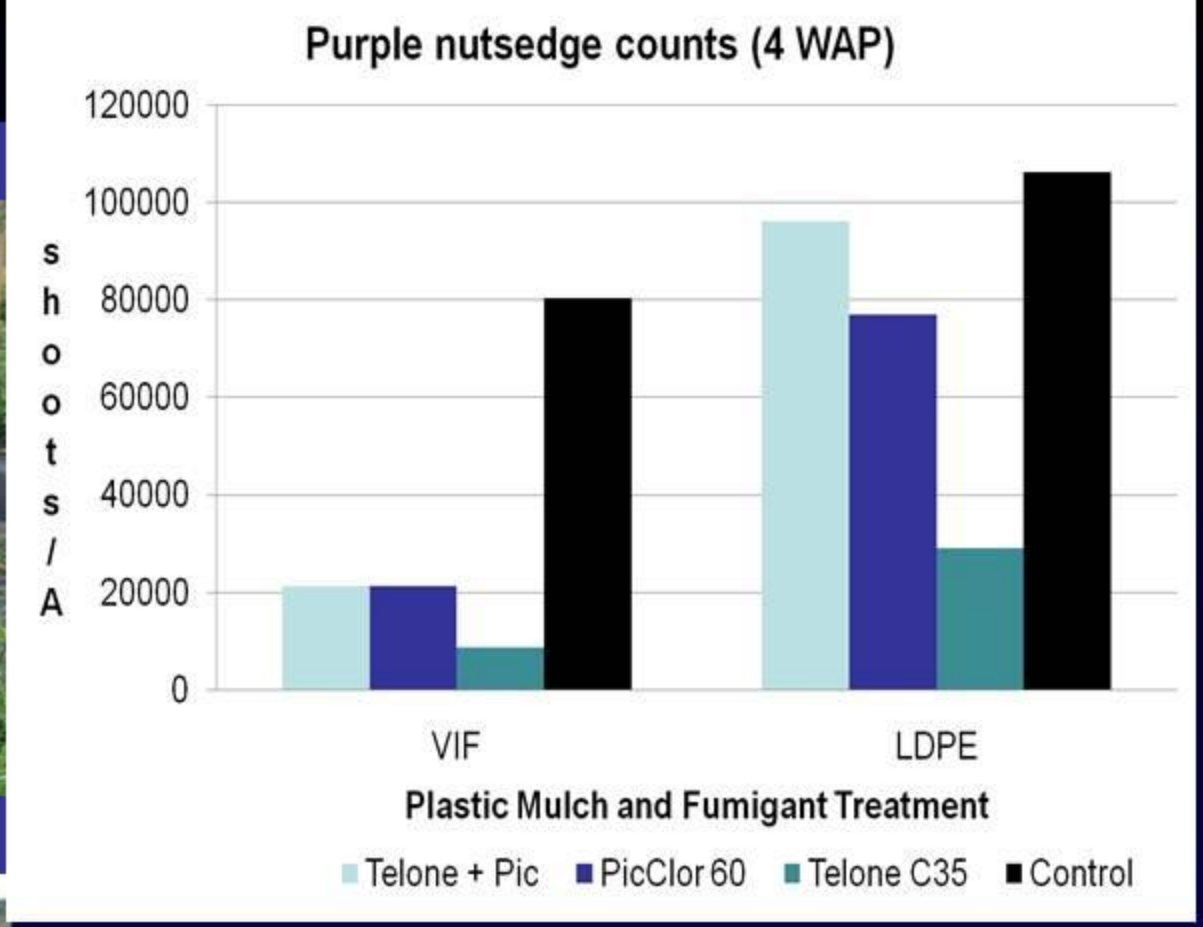
Weeds

Nutsedges
Nightshades
Many Others

Tarp Selection

PicClor 60 LDPE (250 lbs)

PicClor 60 (250 lbs) VIF



Addition of VIF allowed:

- **Longer fumigant retention**
- **Improved nutsedge control 54%**

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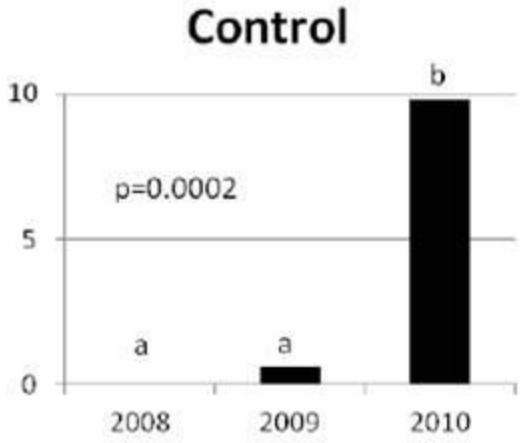
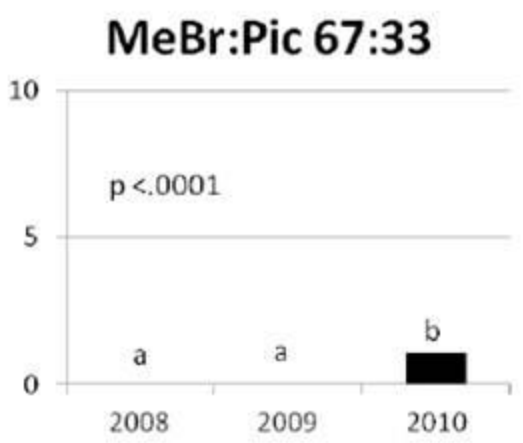
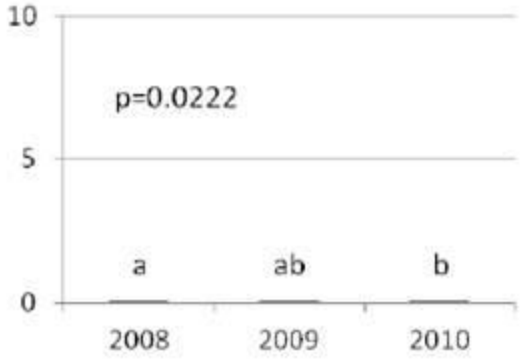
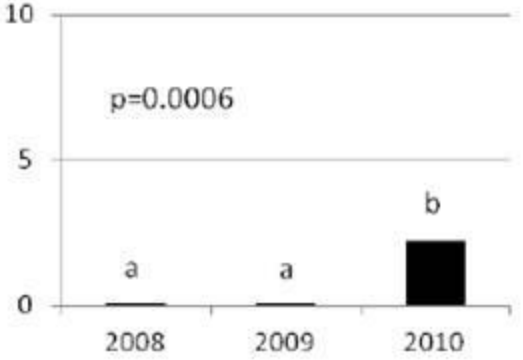
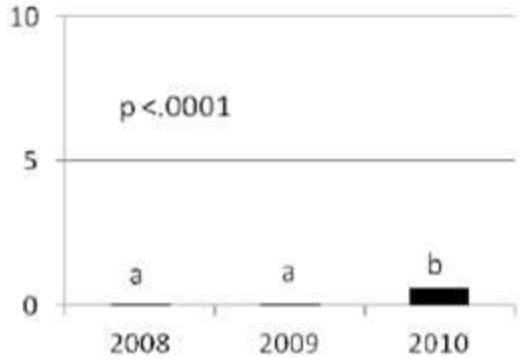
Tomato
Nutsedge (shoots/m^2)
No Herbicide

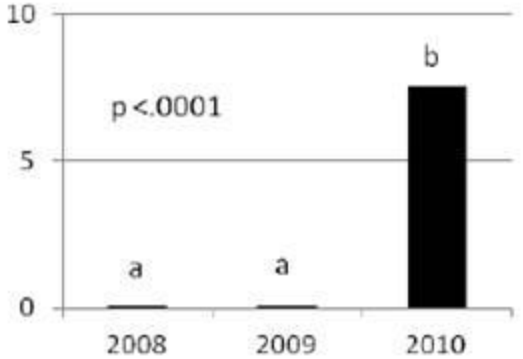






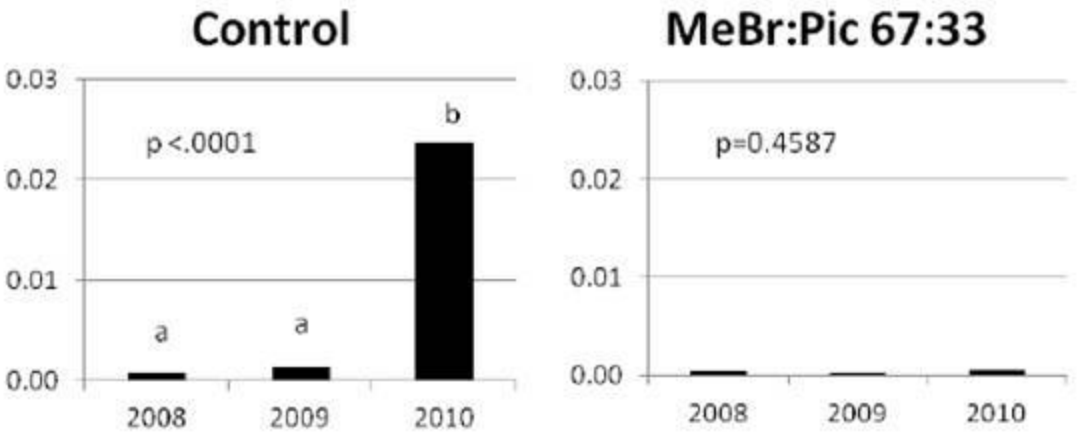


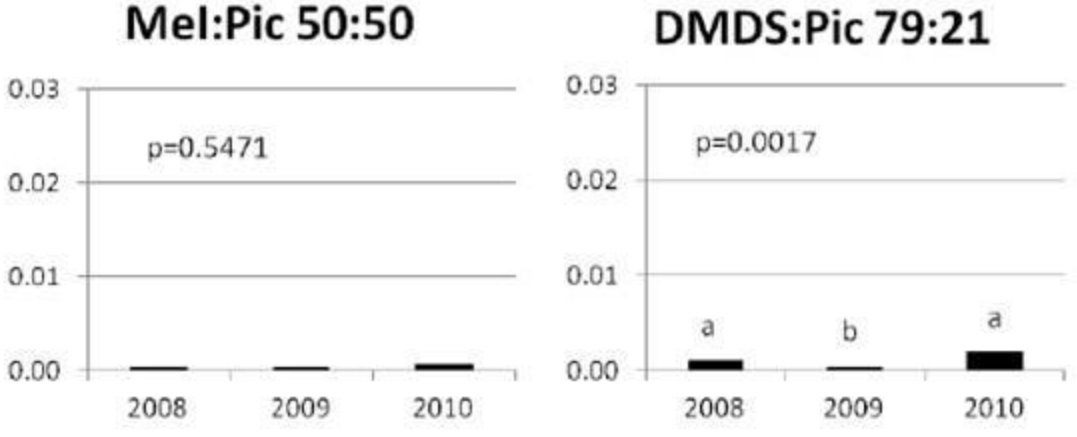


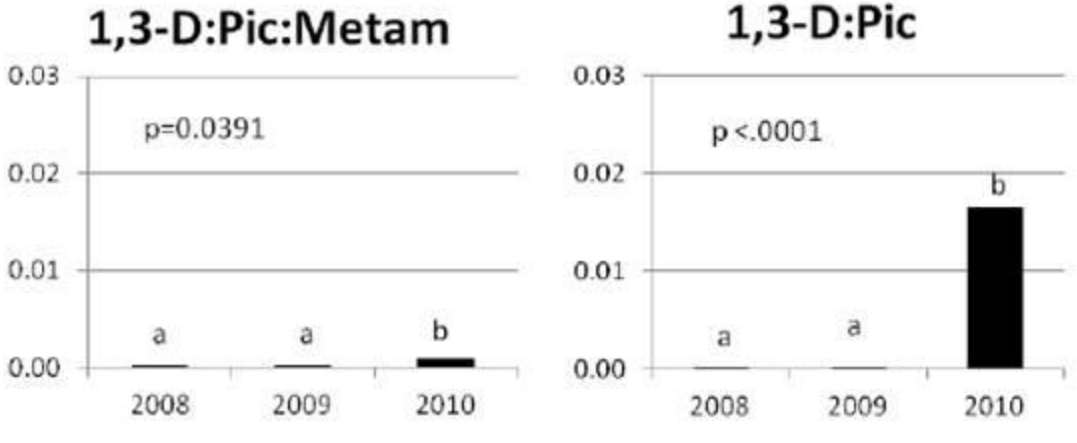


Tomato Nutsedge (shoots/m^2) With Herbicide

Reflex (1pt/A) + Devrinol (4 lbs/A)

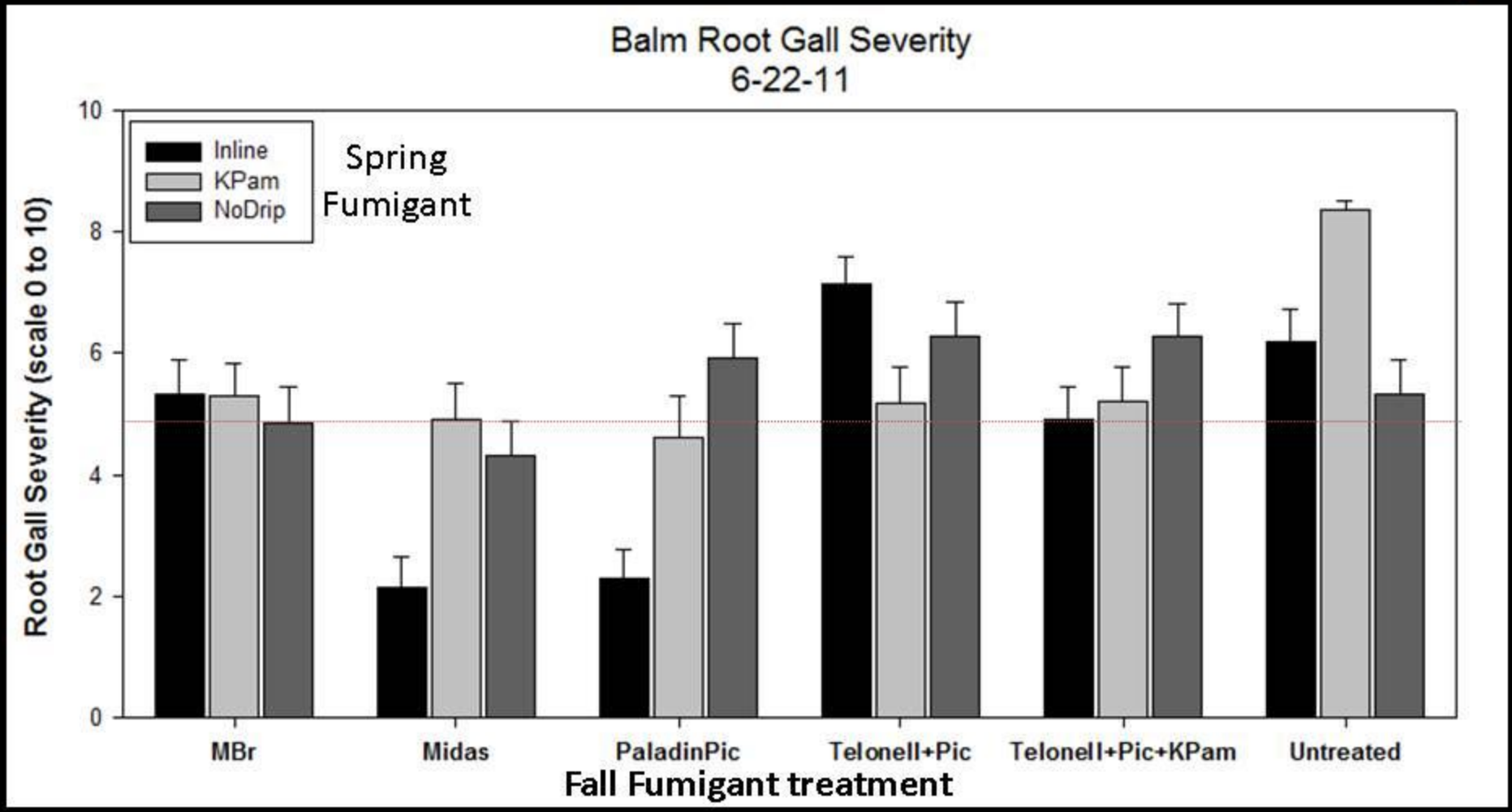






Long term fumigant sustainability trial

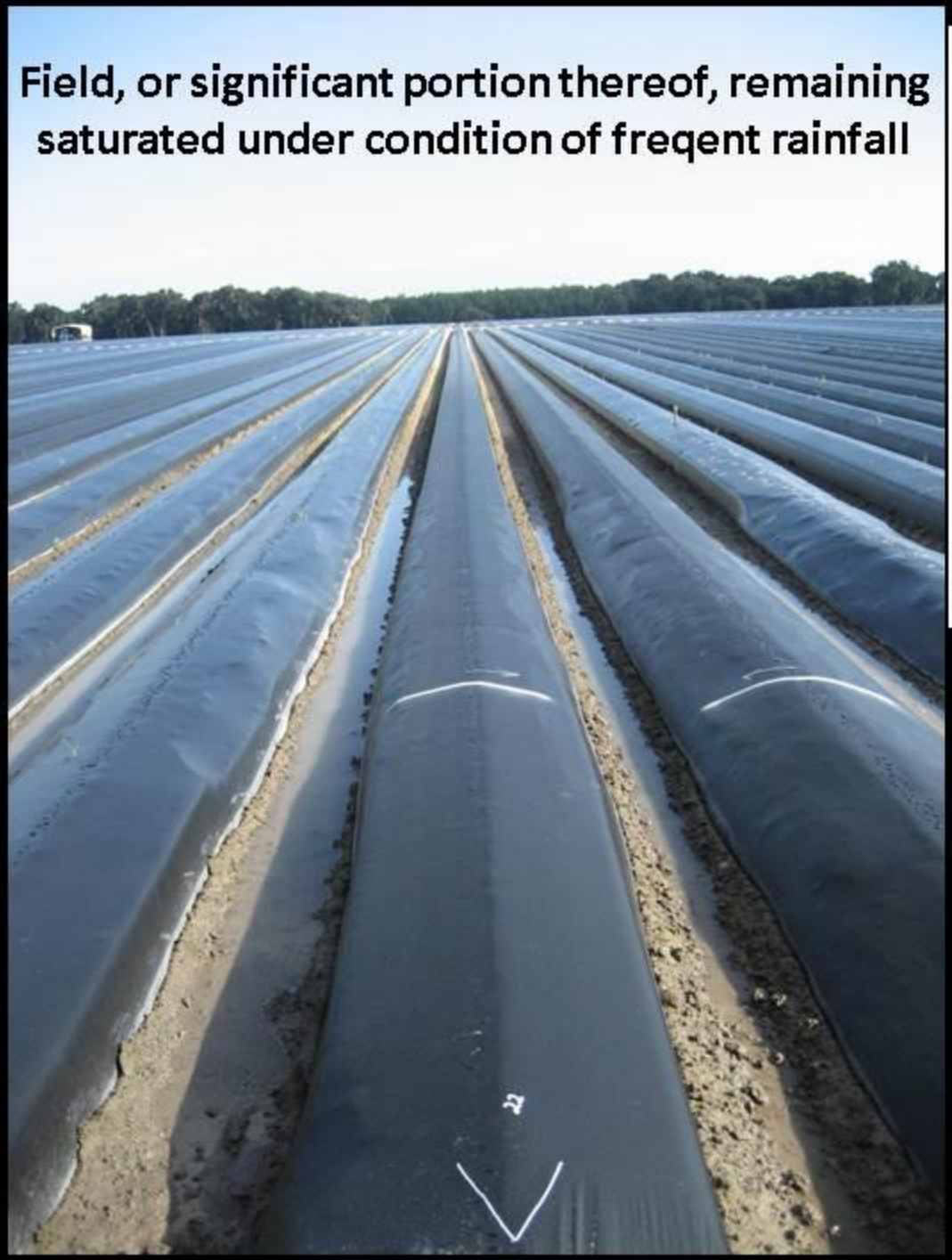
Tomato Root gall Severity / plant

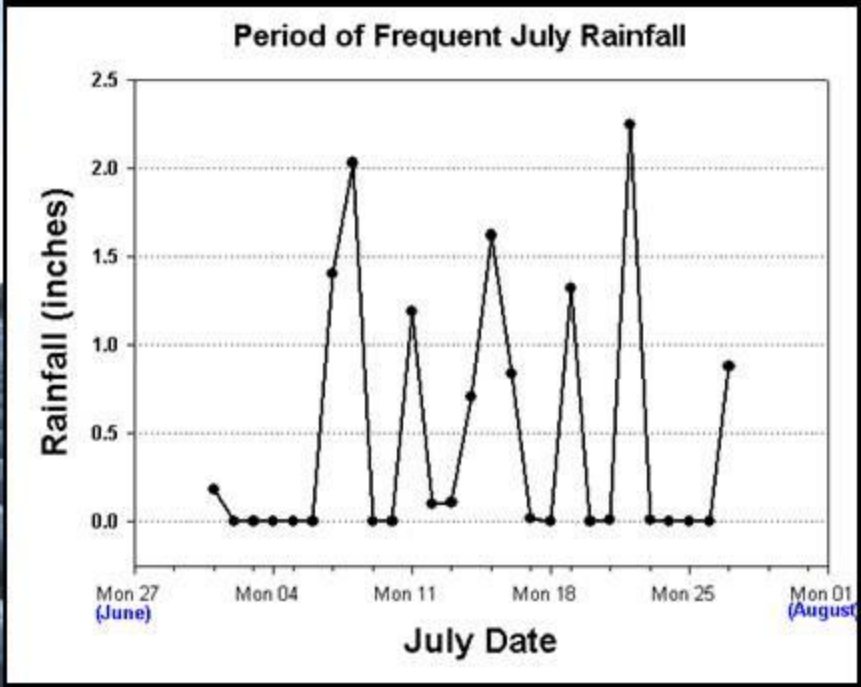


With most treatments, nematodes build to significant numbers by end of 2nd crop each year!

LONG TERM FUMIGANT SUSTAINABILITY TRIAL

- Nutsedge populations are increasing
  - Much slower with the use of a herbicide
- Telone + Pic combination not sustainable
  - Possible if extensive herbicide and fallow programs implemented
- 3-Way is the most consistent program
  - Still needs a herbicide and maybe a fallow program
- Nematodes will be a problem in a double crop
  - Definite advantage for a secondary fumigant





The Environment Strongly Influences Sustainability of Fumigant practice!

- Plant back
- Degraded performance

Economic Sustainability: Production Costs / Market Conditions

Fumigant (50% of Acre)	Rate & Cost LDPE	Rate/Cost VIF (adds $125/a)
Telone C35 ($36)	$910 +herb 35 gta	$1035 +herb 30 gta
Telone II ($22)	$412 +herb 12 gpta	$537 +herb
Paladin+PIC (79/21) ($2.75/ lb) Paladin+PIC+Telone II (44/33/21) ($3.25/ lb)	*Both require VIF*	$1197 +herb 60 gpta $1055 +herb 400 lbta
Chloropicrin ($3.35 lb)	$615 +herb 200lbta	$740 +herb 200 lbta
Pic Clor 60 ($3.46 lb)	$644 +herb 300 lbta	$769 +herb 300 lbta
Metam Sodium ($5.50 gal)	$486 +herb 75 gta	$611 +herb 75 gta
Metam Potassium ($7.50 gal)	$505 +herb 60 gta	$630 +herb 60 gta
3 Way (T+P+V)*	$972 +herb	$1097 +herb
3 Way (Telone C35+Kpam)	$1135 +herb	$1260 +herb 263 lbta
3 Way (PC60+Kpam)	$1024 +herb	$1149 +herb
Methyl Bromide 50/50 ($7.00 lb)	$1505 +herb 350lbta	$1280 +herb 300lbta 25% ↓

Pricing as of Sept 1,2012

* Assumes 200 lb/ta Chloropicrin

Herbicides = Dual Magnum 1pt + Devrinol 2EC 1 gal

IFAS Extension

The Future:

Continued Adoption and refinement to achieve Sustainability

Integrated chemical approach

Constrained by buffers, efficacy, new pests, reg's, shortages

Non fumigant approaches

- **Physical**
- **Cultural**
- **Biological**
- **Environmental**
- **Others**

Substrates, aboveground production, other IPM tactics

Any Questions