Chloropicrin 300 lbs/acre with a tarp

The Alternative to MB

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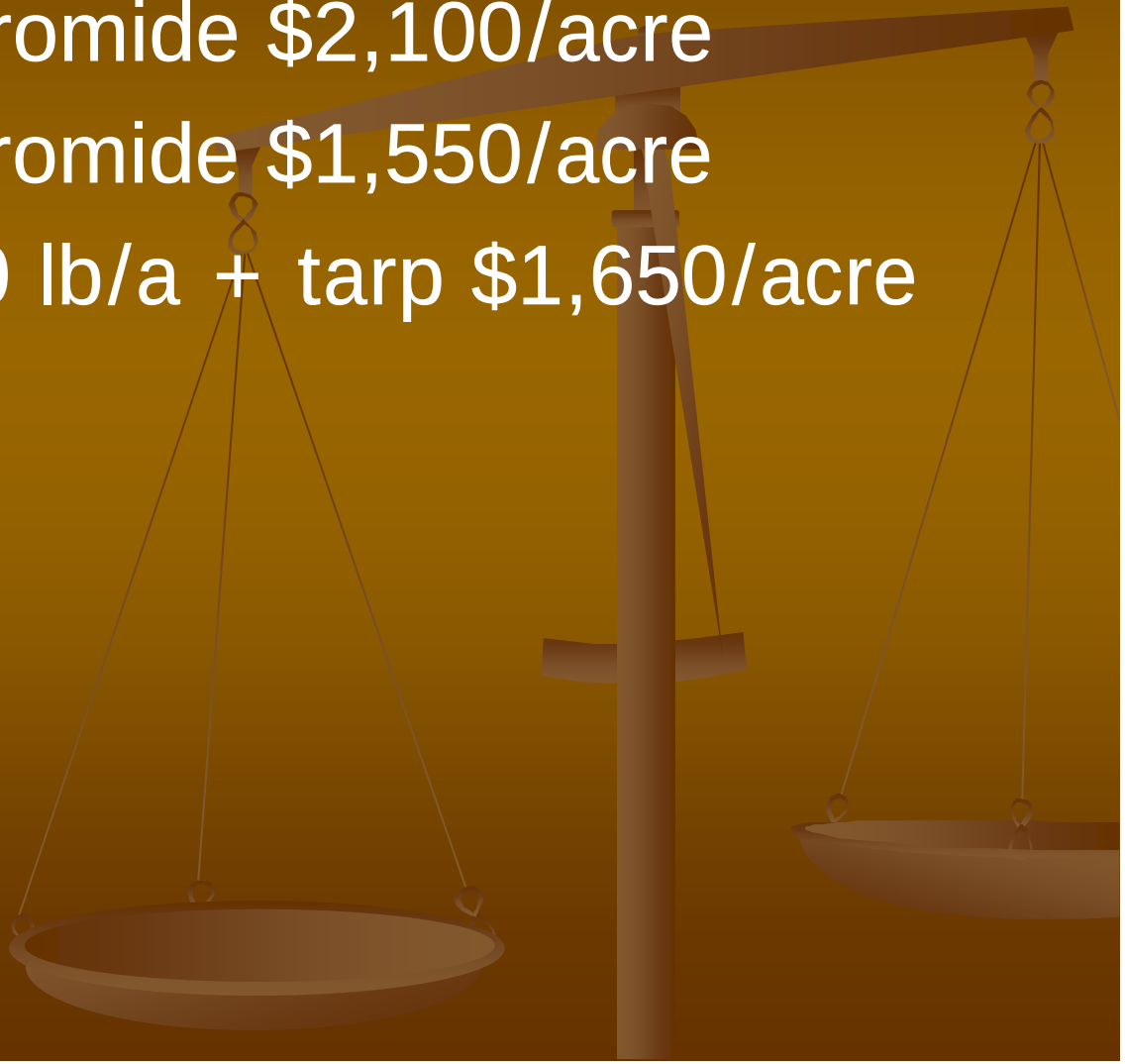
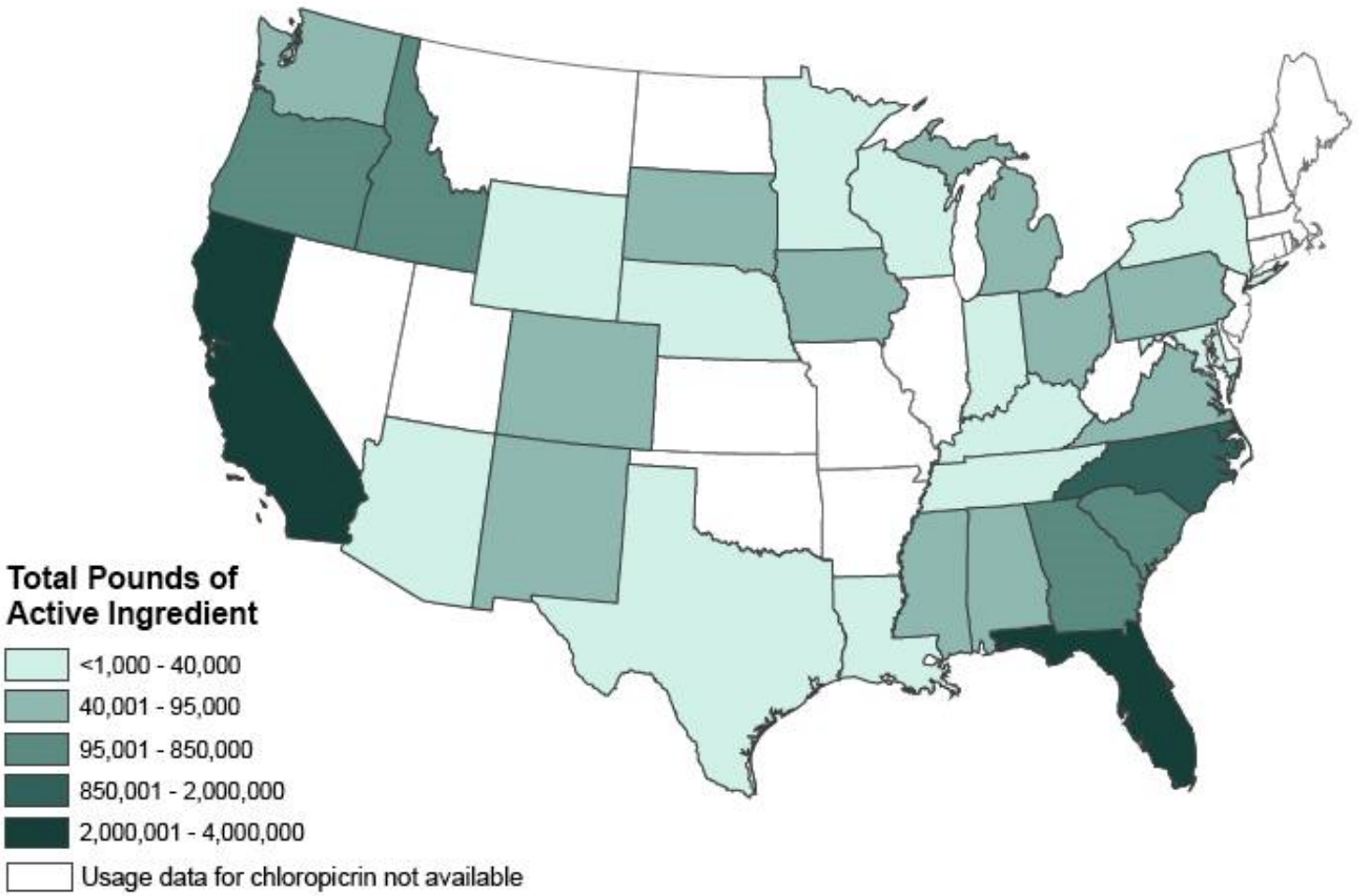
Price of soil fumigation

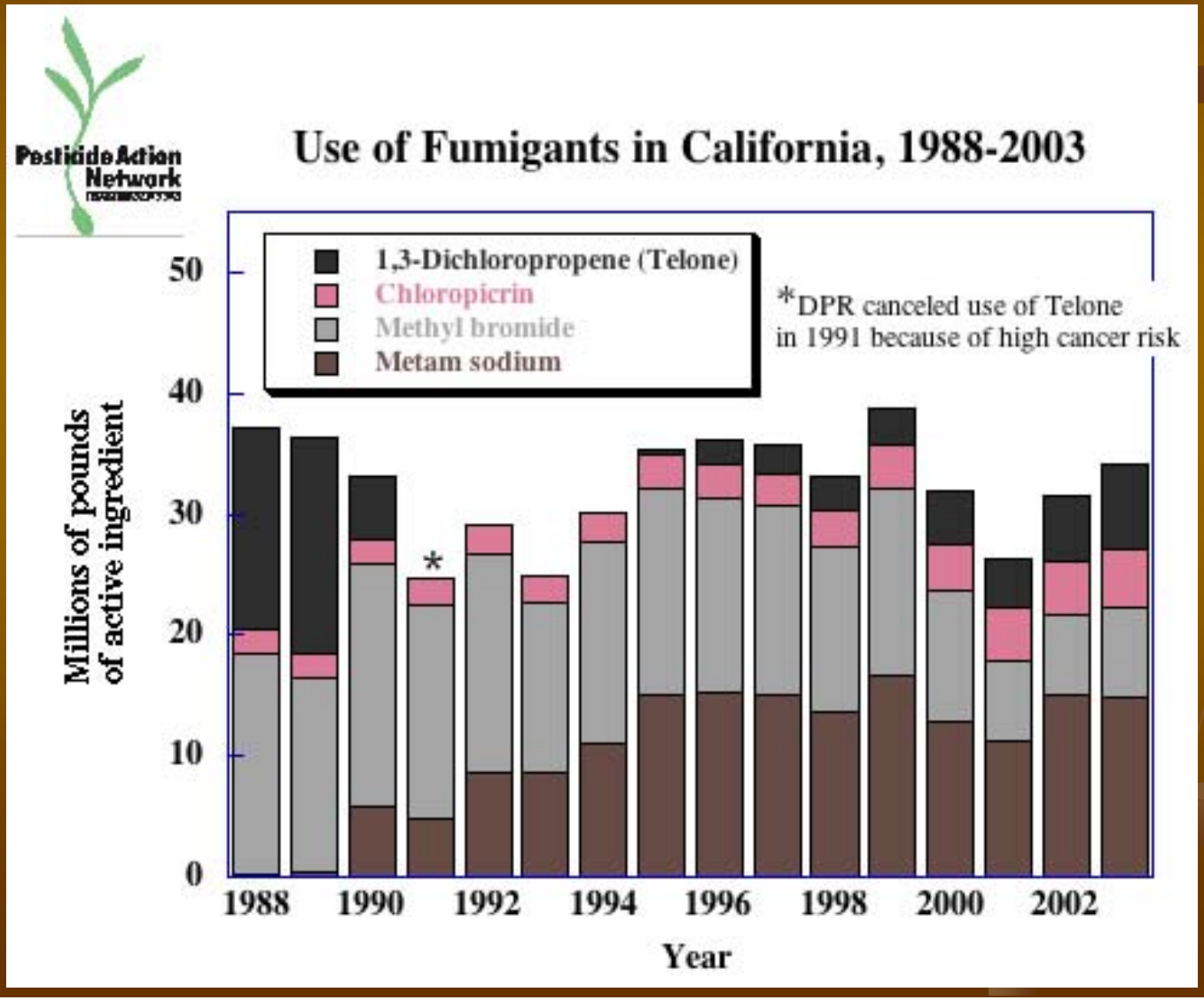
- CUE – methyl bromide $2,100/acre
- QPS – methyl bromide $1,550/acre
- Chloropicrin 300 lb/a + tarp $1,650/acre



Chloropicrin
Annual Pounds of Active Ingredient Applied
3 Year Average (2002-2004)



Use of Chloropicrin is increasing

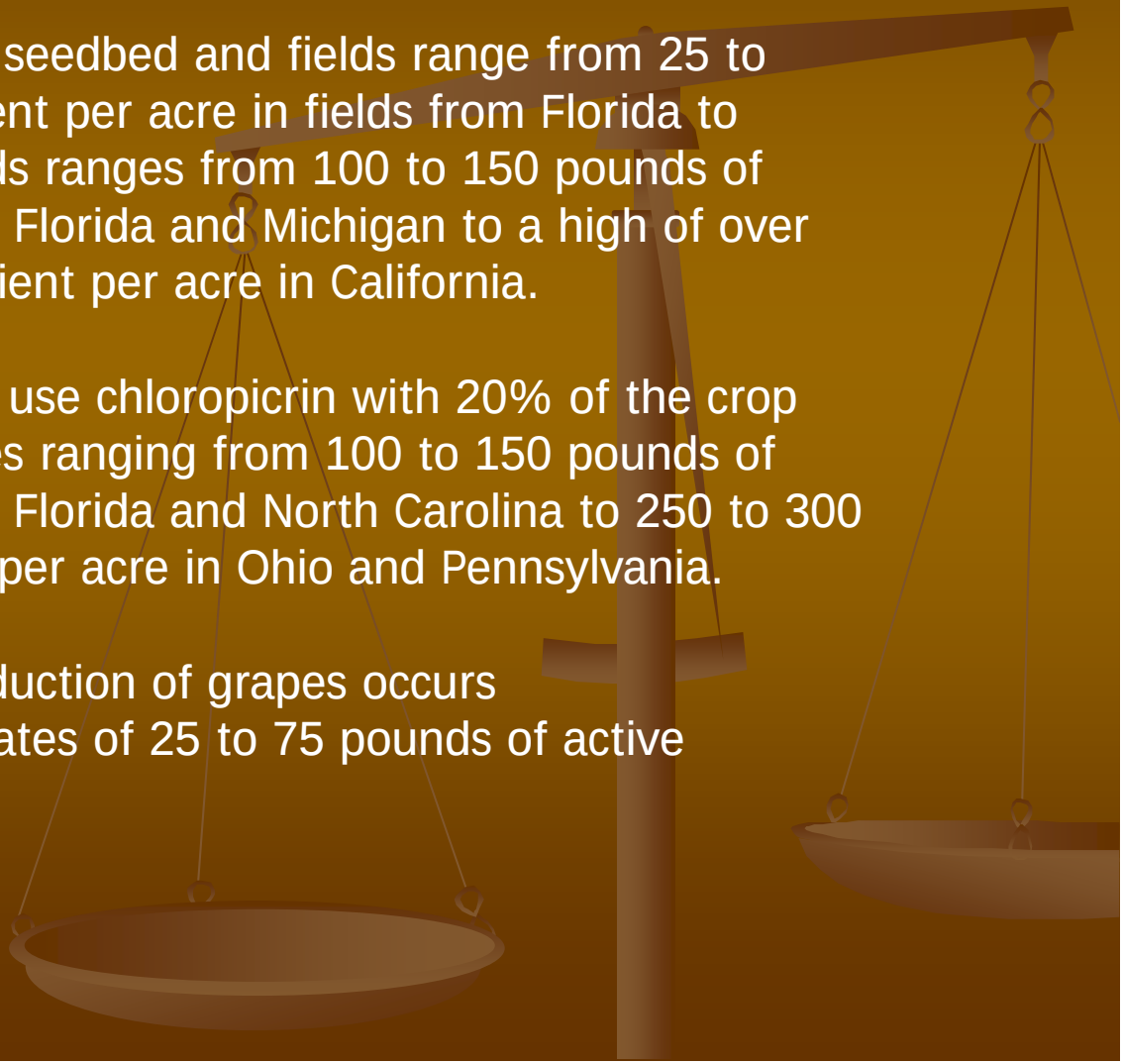


Low rates used in other crops

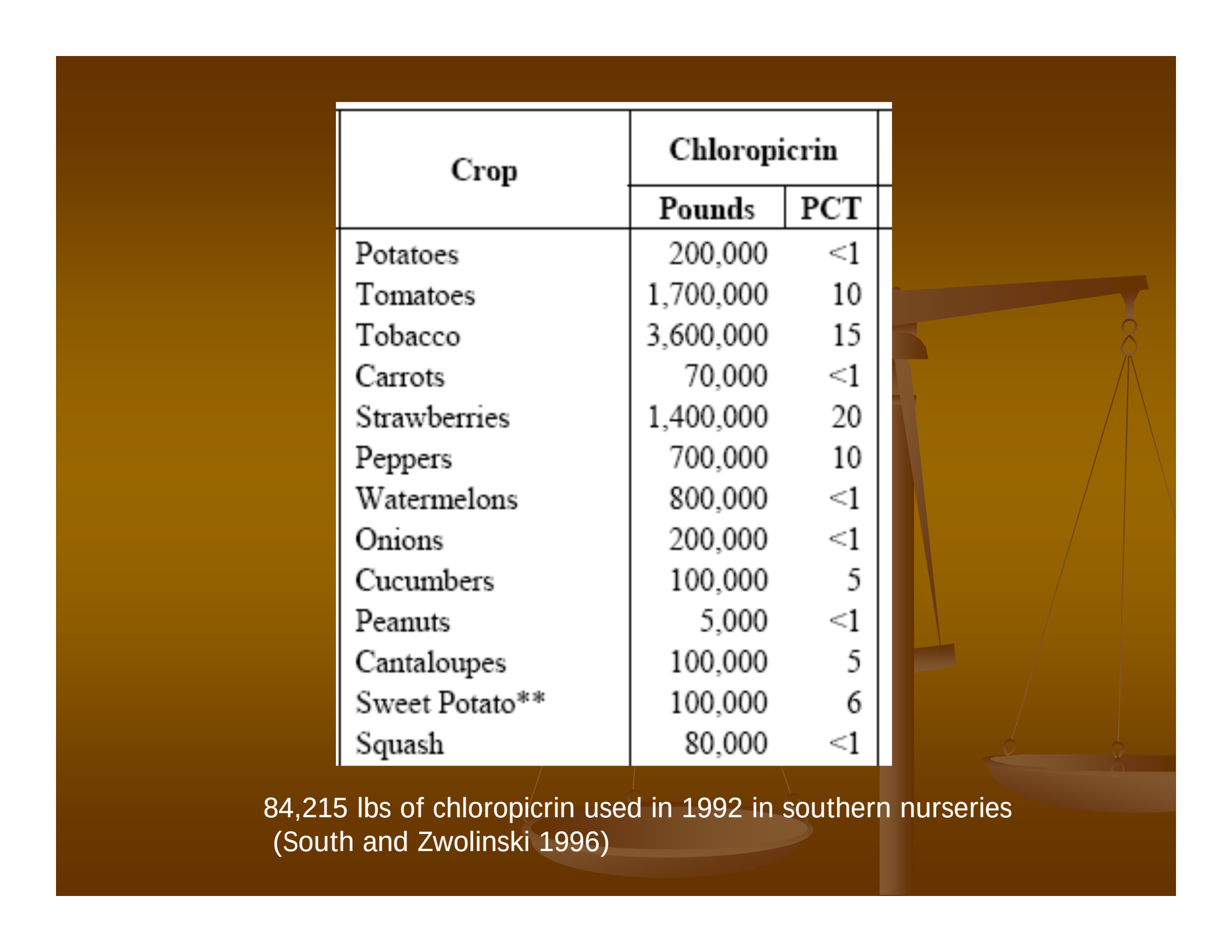
Application rates in tobacco seedbed and fields range from 25 to 75 pounds of active ingredient per acre in fields from Florida to Virginia. Use on tomato fields ranges from 100 to 150 pounds of active ingredient per acre in Florida and Michigan to a high of over 300 pounds of active ingredient per acre in California.

Strawberry fields commonly use chloropicrin with 20% of the crop treated with application rates ranging from 100 to 150 pounds of active ingredient per acre in Florida and North Carolina to 250 to 300 pounds of active ingredient per acre in Ohio and Pennsylvania.

Replanting and nursery production of grapes occurs primarily in California with rates of 25 to 75 pounds of active ingredient per acre



Crop	Chloropicrin	
	Pounds	PCT
Potatoes	200,000	<1
Tomatoes	1,700,000	10
Tobacco	3,600,000	15
Carrots	70,000	<1
Strawberries	1,400,000	20
Peppers	700,000	10
Watermelons	800,000	<1
Onions	200,000	<1
Cucumbers	100,000	5
Peanuts	5,000	<1
Cantaloupes	100,000	5
Sweet Potato**	100,000	6
Squash	80,000	<1



84,215 lbs of chloropicrin used in 1992 in southern nurseries (South and Zwolinski 1996)

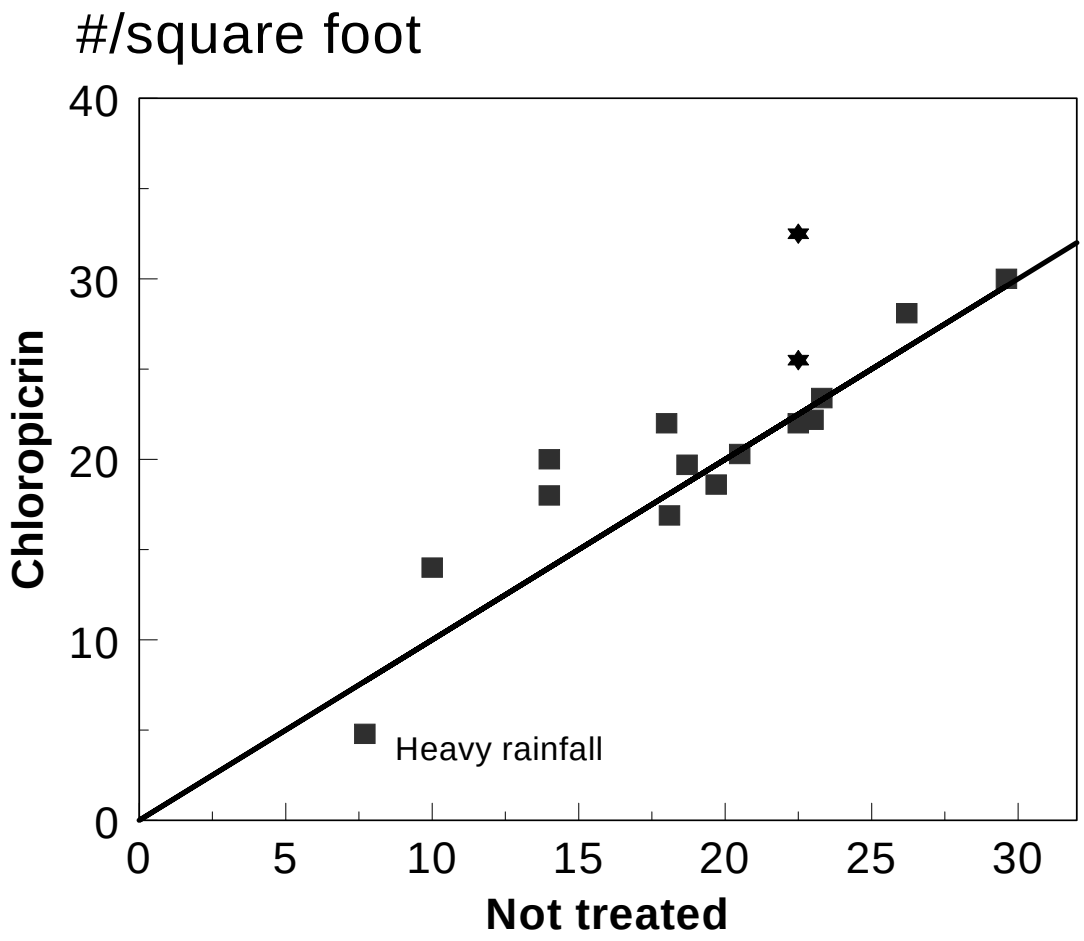
- The Southern Forest Nursery Management Cooperative began testing 100% chloropicrin in 1992. When tarped and used at a rate of 300 lbs/acre, seedling production is generally comparable to that obtained from methyl bromide. In contrast, certain other legal alternative fumigants have: (1) been unreliable; (2) stunted or killed adjacent seedlings; (3) produced variable seedlings; and (4) suppressed beneficial *Trichoderma*.

Table 1. Fumigant trials in loblolly pine seedbeds that included 100% chloropicrin under a tarp.

Year	Nursery	Rate lbs/ac	Season	Plantable seedlings (diff. from untreated)	Reference
	LOBLOLLY PINE			#/sq.ft.	
1992	Statesboro, GA	250	Fall	+1.2	Carey 1994
1993	Summerville, SC	250	Spring	+1.1	Carey 1994
1994	Providence Forge, VA	300	Spring	+0.9	Carey 1995b
1994	Washington, NC	300	Fall	+3	Weyerhaeuser #10
1994	Ft. Towson, OK	300	Fall	+10	Weyerhaeuser #7

Year	Nursery	Rate lbs/acre	Season	Plantable seedlings (diff. from untreated)	Reference
	LOBLOLLY PINE			#/sq.ft.	
1994	Winona, MS	250	Spring	-1.2	Carey 1996
1996	Byromville, GA	300	Winter	+1.7	Carey 1998a
1997	Byromville, GA	300	Spring	+4.0	Carey 2000
1998	Atmore, AL	300	Spring	-0.8	Cram et al. 2002
1998	Byromville, GA	300	Spring	-0.5	Cram et al. 2002
1998	DeRidder, LA	250	Spring	+6.0	Carey 2000
1998	Glennville, GA	250	Spring	+2.0	Carey 2000
1998	Bullard, TX	300	Winter	-0.7	Carey 1998b
1999	Chatsworth, GA	300	Spring	-0.2	Cram et al. 2002

Year	Nursery	Rate lbs/acre	Season	Plantable seedlings (diff. from untreated)	Reference
	SLASH PINE			#/sq.ft.	
1996	Byromville, GA	300	Winter	-0.7	Carey 1998a
1997	Byromville, GA	300	Spring	+2.0	Carey 1998c
1998	Glennville, GA	250	Spring	+4.0	Carey 2000
2001	Glennville, GA	300	Spring	-2.9	Carey et al. 2004

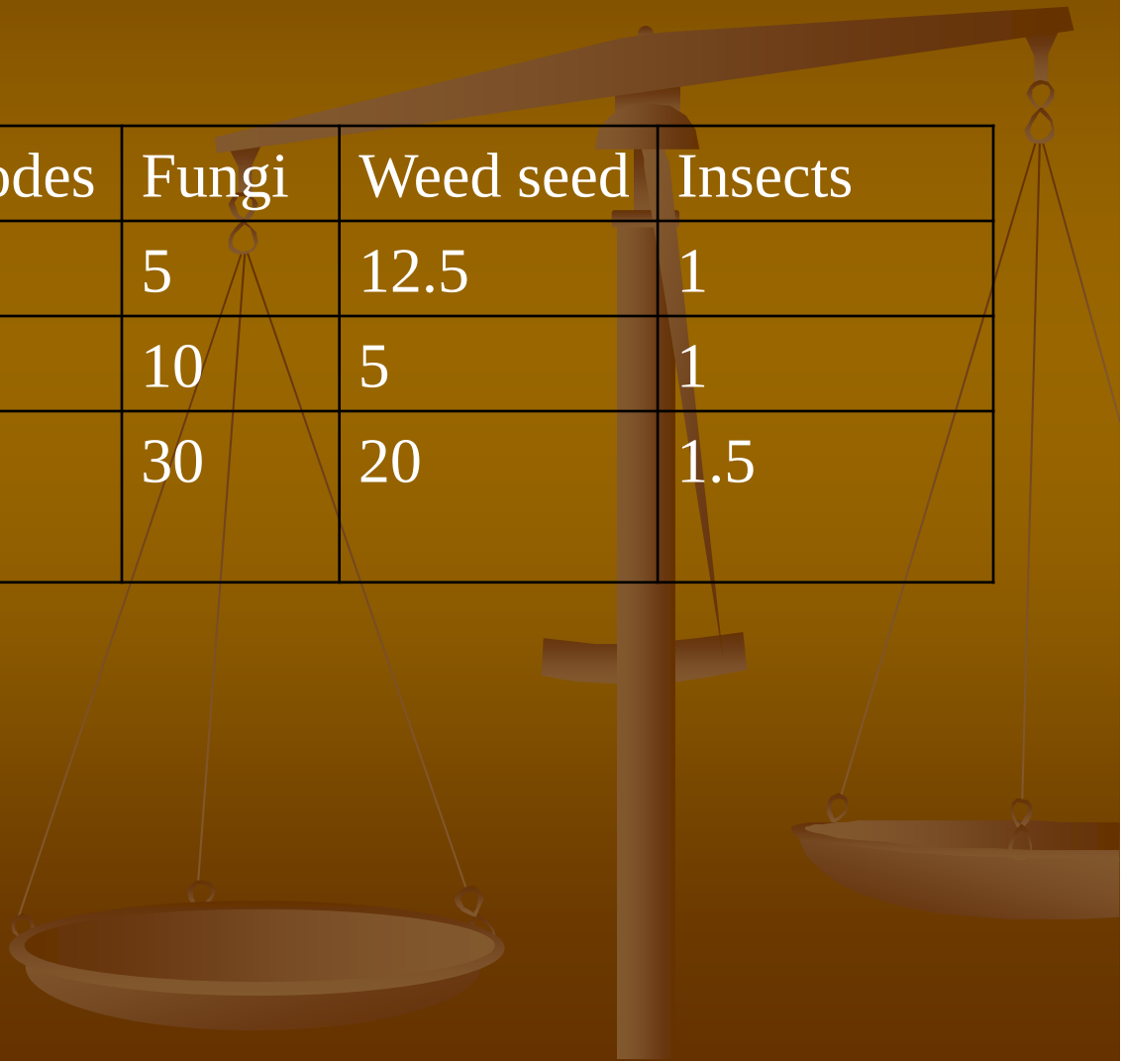


Assuming 29,000 square feet of seedbed per treated acre, increasing seedling production by 1.2 seedlings per square foot would increase crop value by $1740 per acre (at 5 cents per seedling). Under these assumptions, we could justify fumigation with chloropicrin 11 out of 19 times.

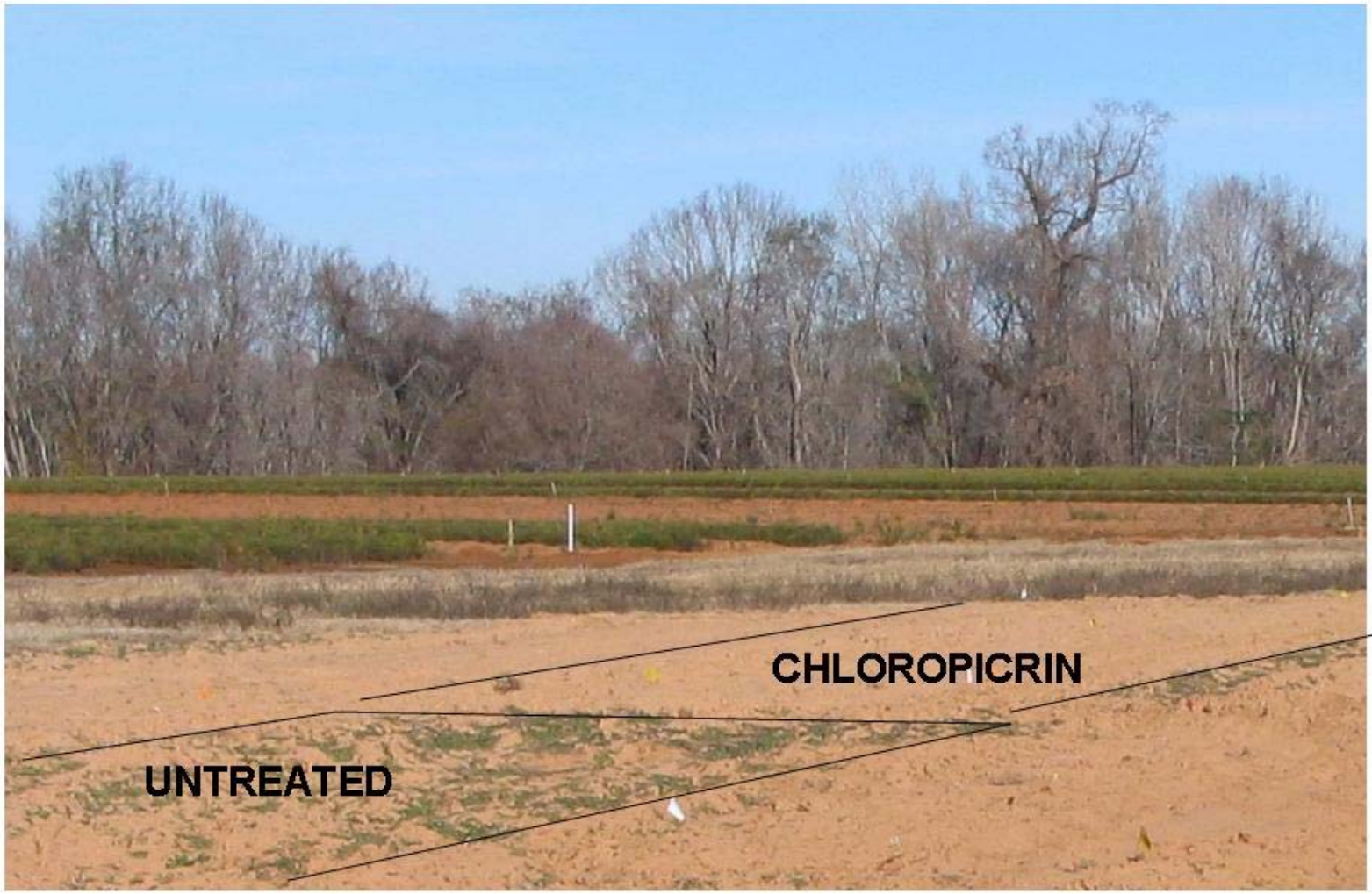

chloropicrin
No Fumigation

Relative amount of chemical required to control soil pests (Adapted from Goring 1962; and Goring and Hamaker 1972).

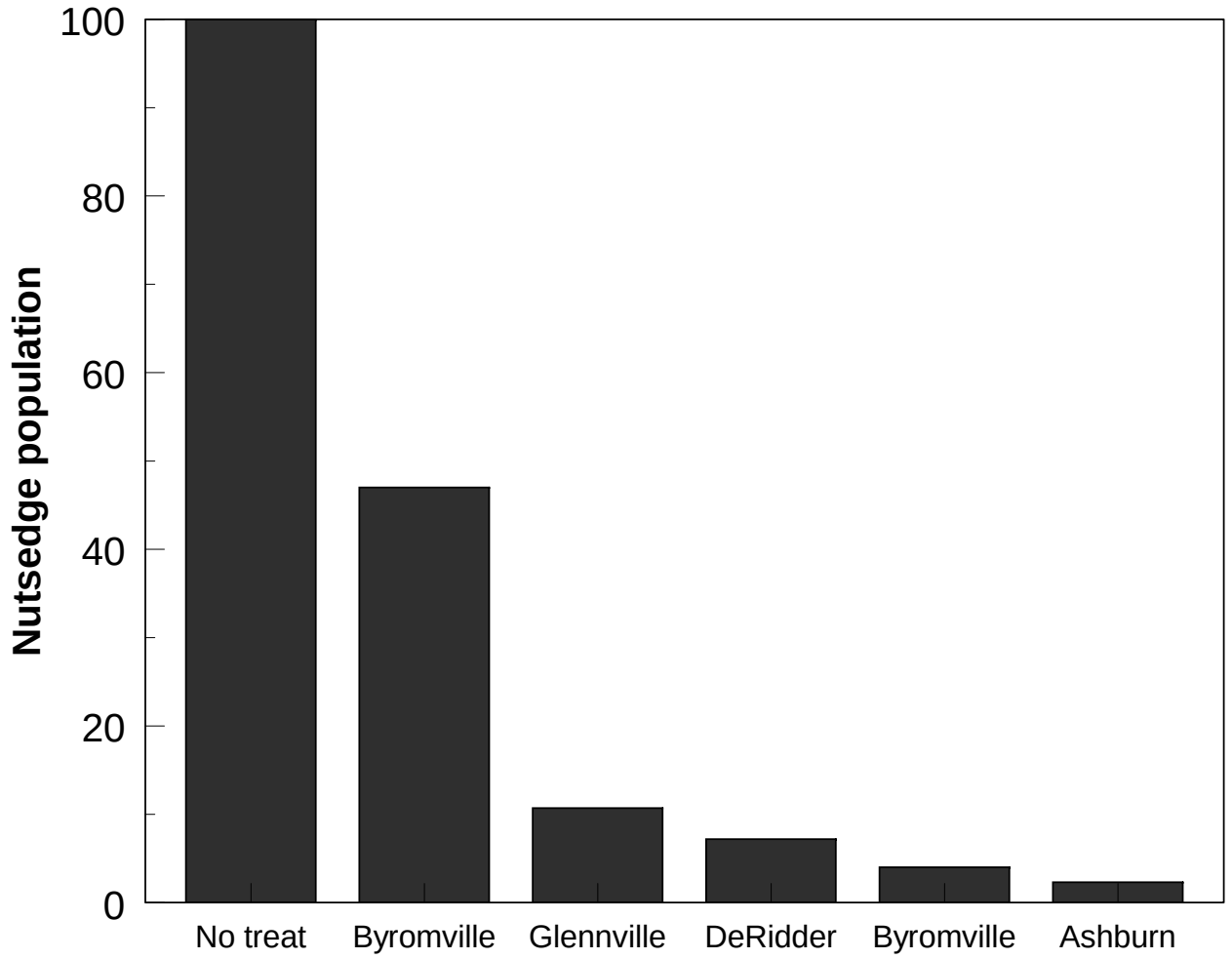
Fumigant	Nematodes	Fungi	Weed seed	Insects
Chloropicrin	4	5	12.5	1
Methyl Bromide	4	10	5	1
1,3,-dichloropropene	3	30	20	1.5



Indian Mound, TX 2006 Fall fumigation 300 lb/acre

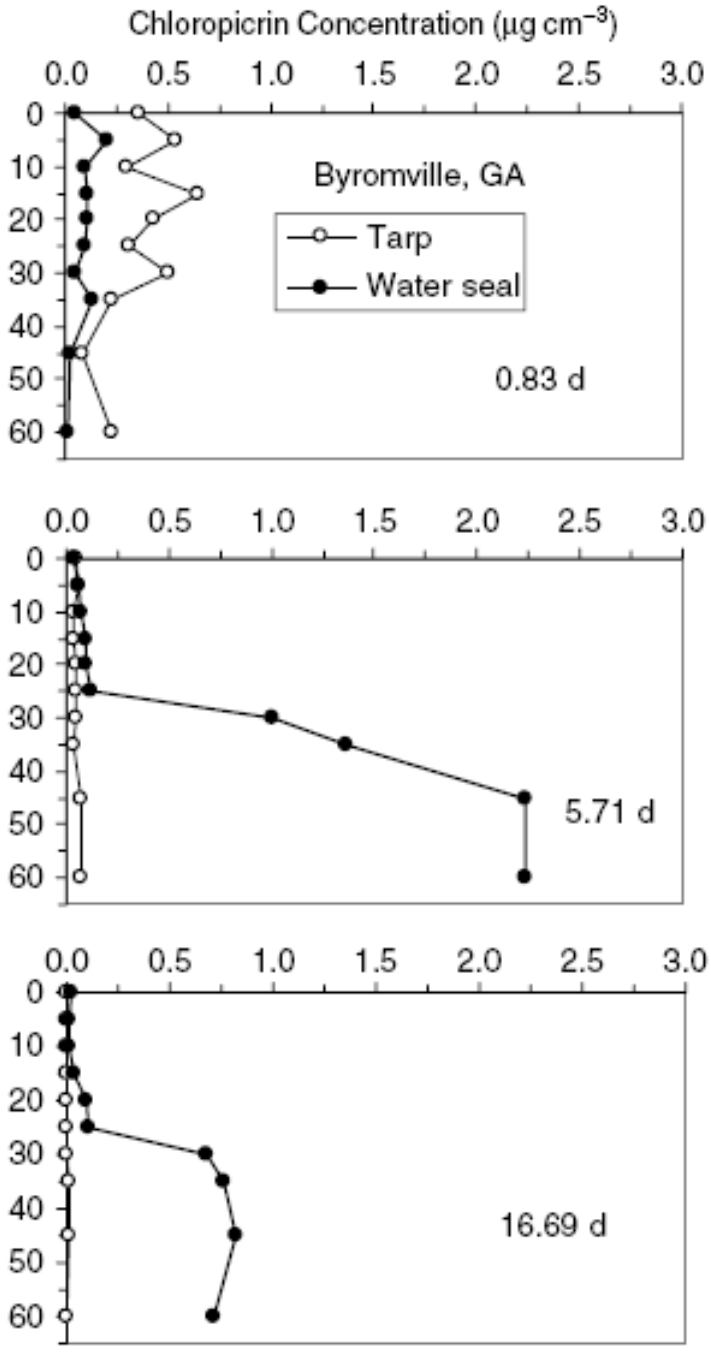


Chloropicrin has activity on yellow and purple nutsedge when applied at 250 to 300 lbs/acre (plus a tarp)



Nutsedge by treatment at the Beauregard Nursery DeRidder, LA

Use a tarp



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Pest Manag Sci **62**:263–273 (2006)

If your nursery has not had a nematode problem in the past, fumigate with chloropicrin. Fall fumigation is recommended.... (and keep plastic down for 4 weeks or so).

BROADCAST APPLICATION

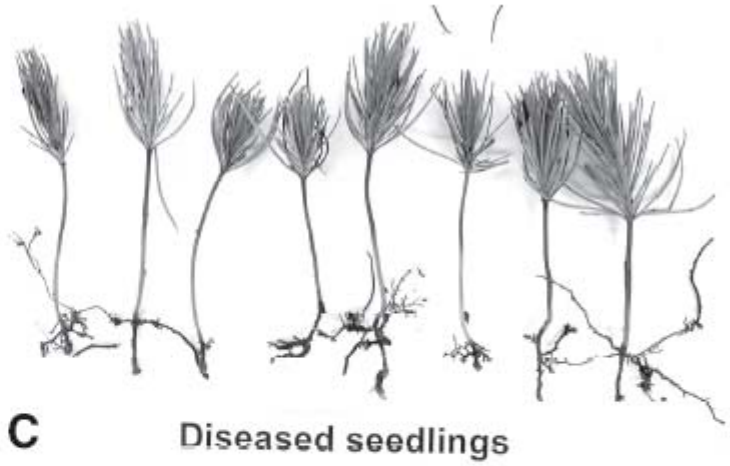
Apply Chloropicrin from Arvesta Corporation by means of chisels spaced no more than 12 inches apart and at a depth of 8 inches below soil surface. To seal in fumigant after application, drag or cultipack immediately behind chisels, or wet down treated area to a depth of 1 inch, or cover treated area with a plastic tarpaulin. If plastic tarpaulin is used, it should remain, for a minimum of 48 hours. Do not apply to areas adjacent to fields where valuable crops are growing nor adjacent to buildings inhabited by humans or livestock. Fumigation of small volumes of soil or mushroom casing soil may be made by injecting chloropicrin 6-8 inches deep in a grid pattern not to exceed 12 inch spacing.

RECOMMENDED DOSAGES – PREPLANT SOIL FUMIGATION

LAND TO BE PLANTED TO	POUNDS PER ACRE
Floral Crops, Nursery Crops	500

If you know you have a nematode problem,
Fumigate with Telone II and chloropicrin

A

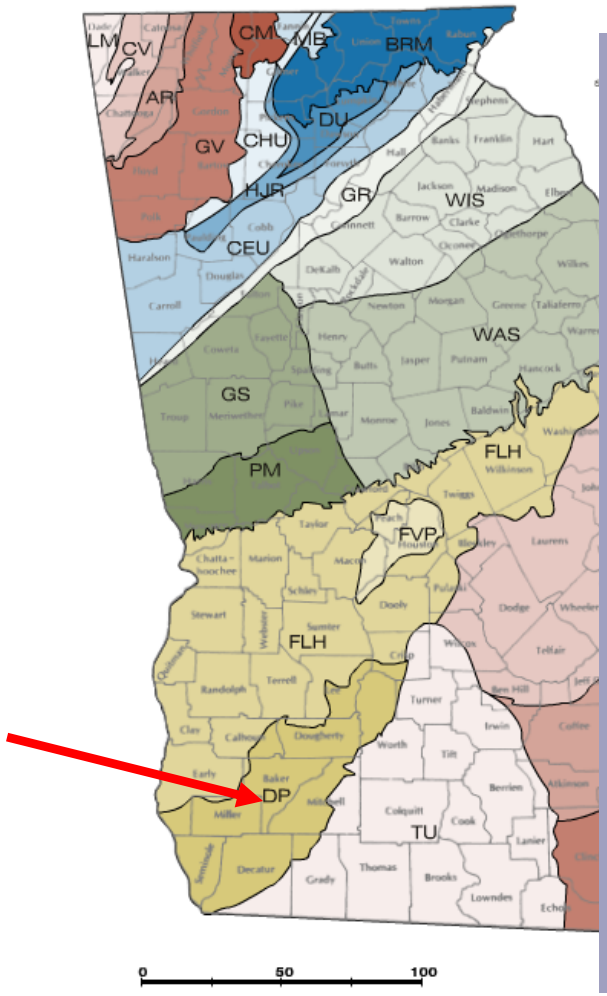


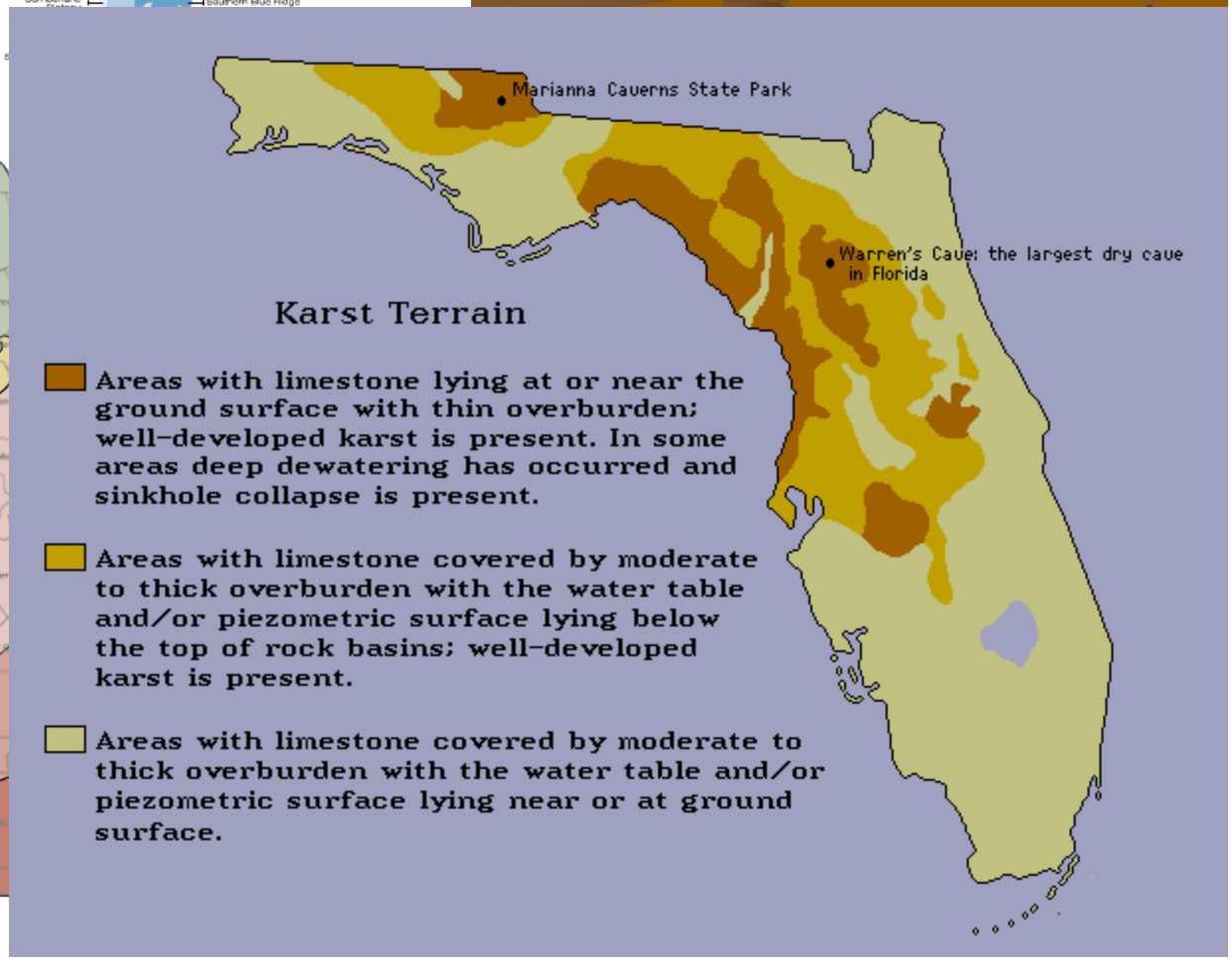
C Diseased seedlings

Figure 1. Patches of stunted loblolly pine seedlings at Flint River Nursery ***A****. Root systems of healthy* ***B****, and diseased* ***C****, 10-week old seedlings.*

If your nursery is on a karst soil then do not treat with Telone and fumigate with chloropicrin.

Physiographic Districts of Georgia





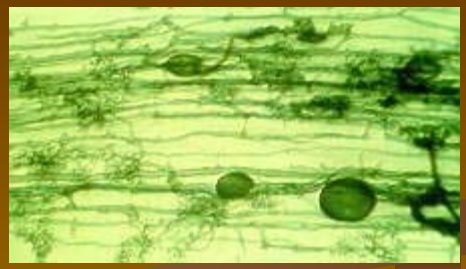
Telone/Chloropicrin over three pine crops had to be abandoned after the second year due to excessive nutsedge invasion. Failure to eradicate nutsedge at fumigation is the first step to spread of this weed during various cultural practices.
Mechanical weed control as an alternative to effective herbicides is not economically viable.

If your nursery has a nutsedge problem, then adopt a 24/7 IPM program This IPM program may include: glyphosate on fallow ground, Permit ® and Roundup on RR-corn crop, directed applications of glyphosate, dense cover-crops, Reflex on nutsedge patches, Eptam before sowing. Oust on fallow land. Zero tolerance of live nutsedge plants.

What about hardwoods?

Treat oaks, pecan, hickory and willow the same as pines.

What about endomycorrhizal hardwoods like sweetgum, maple, Yellow poplar, sycamore etc.?



After sowing, use DAP instead of AN as the nitrogen fertilizer.

Figure 1. 2+2 Pinus strobus *transplant stock (center) shows bleached out needlesfollowing fumigation of fallow field (right) with Vapam®.*

Summary

If your state has QPS, then you might pay less than $1,600/a for methyl bromide.

- If your state does not have QPS, then you might pay less than $1,700 for 300 lbs of chloropicrin.
- Nutsedge control will require a 24/7 program that involves herbicides.

Questions?

Global Change Biology (2004) **10**, 1009–1016, doi: 10.1111/j.1365-2486.2004.00782.x

Ectomycorrhizal fungi: A new source of atmospheric methyl halides?

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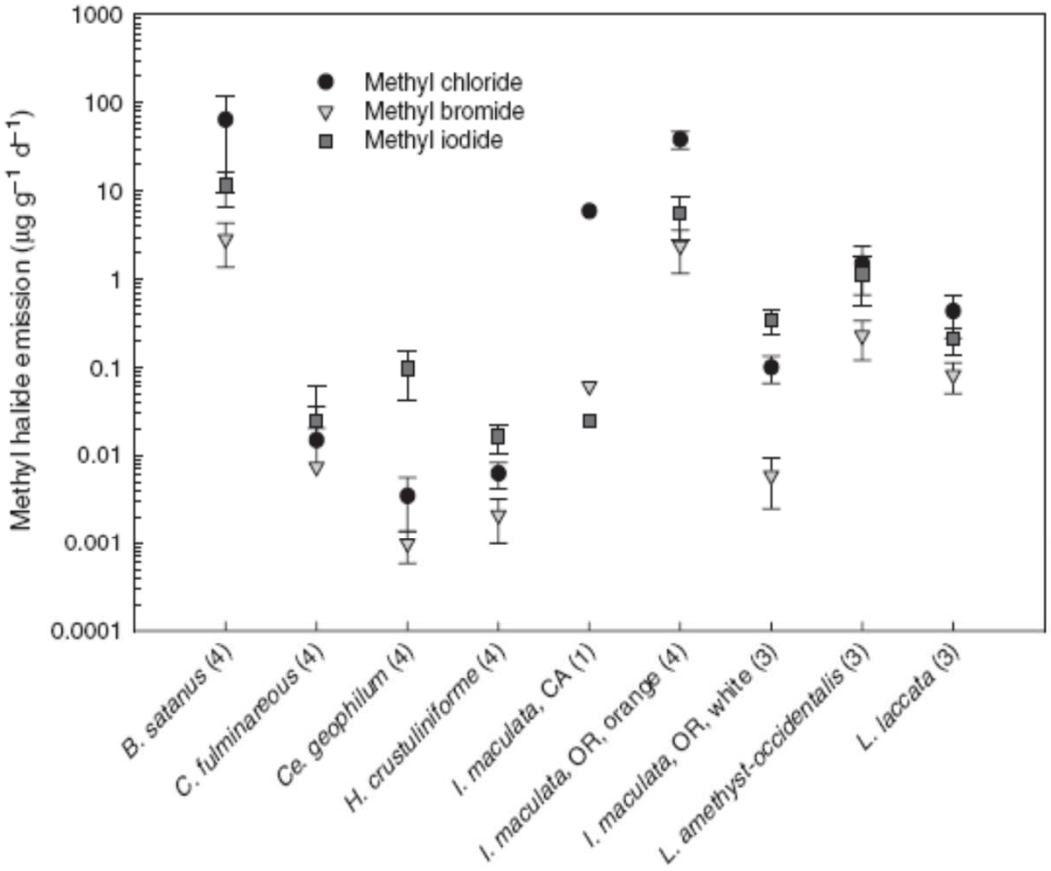

Fig. 1 Emission of methyl chloride (•) methyl bromide (▼) and methyl iodide (■) by various ectomycorrhizal isolates. Fungi were grown in media containing 700 ppm Cl^-, 16 ppm Br^-, and 3.5 ppm I^-. Values in parentheses after names indicate number of sample replicates. Note log scale of emissions. Symbols represent means ± 1SD.