UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON D.C., 20460

OFFICE OF
PREVENTION, PESTICIDES AND TOXIC
SUBSTANCES

MEMORANDUM

SUBJECT: Assessment of the Benefits of Soil Fumigation with Chloropicrin, Metam-Sodium, and Methyl Bromide in Eggplant Production (DP# 337490)

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SUMMARY

This assessment measures the benefit of chloropicrin, metam-sodium, and methyl bromide use in eggplant production in California and the Southeastern states of Florida and Georgia. These eggplant production regions account for two thirds of U.S. eggplant acreage and the vast majority of eggplant fumigant use in the U.S. Eggplant is grown in open fields, on raised beds, under organic mulch and plastic tarps, often followed by non-solanaceous vegetable crops. In Florida and Georgia, chloropicrin, in combination with methyl bromide, is applied to over 2,000 acres of eggplant, which is about 80% of the acres grown. In California about 20% of eggplant acreage is fumigated with methyl bromide and chloropicrin or metam-sodium. In total, nearly half of U.S. eggplant production (2,500 acres) is fumigated. Fumigants are used to control a mix

of nematodes, plant pathogens, and weeds. Without fumigants, these target pests may reduce yields by 5 to 20 percent in California and 29 to 55 percent in Georgia and Florida. Given the severity of the estimated benefits of fumigation, BEAD anticipates that half of U.S. eggplant acreage may be unable to continue eggplant production without their use. We estimate the benefit of the use of fumigants in U.S. eggplant production to be approximately $20 million.

STATEMENT OF PURPOSE

As part of the Reregistration Eligibility Decision (RED) process, EPA is assessing the risks and benefits of the use of several soil fumigants as a group: chloropicrin, metam-potassium, metam-sodium, and methyl bromide. This document presents the assessment of the benefits to eggplant production that is provided by these soil fumigants. Conceptually, the benefits of a pesticide like a soil fumigant are comprised of the improvements in production and/or reductions in cost resulting from the pesticide use. The social benefits of a pesticide are divided between the users of the pesticide, *e.g.*, eggplant producers, and consumers of eggplants and eggplant-containing products. Consumers benefit because higher production and/or lower costs translate into a cheaper and more abundant supply of eggplant. The impact of fumigant regulation on this consumer benefit is not explicitly evaluated in this document.

In evaluating the benefits of soil fumigants, this document compares the current situation in which fumigants are available for use, subject to existing label restrictions, to the situation that is estimated to occur were the fumigants not available. This is somewhat different from other BEAD assessments of the impacts of regulation, in that no specific regulatory scheme is considered.

BACKGROUND

Eggplant producing states as surveyed by the National Agricultural Statistics Service (NASS) are described in Table 1. There are approximately 5,800 acres of eggplant harvested for the fresh market each year in the U.S. Yield, price, value of production, harvested acres, and total production volume are given by state and for the U.S.

Table 1. Eggplant: Yield, Price, Production Value, Acres Harvested, and Total Production, for the Fresh Market, by State and U.S. Total, 2000 and 2001 Average.

State	Yield (CWT) [1]	Price ($/CWT)	Value Of Production ($1,000)	Acres Harvested	Total Production (1,000 CWT)
California[2]	490	33	8,541	1,500	329
Connecticut	105	33	418	115	13
Florida	255	32	13,627	1,700	434
Georgia	533	19	7,176	775	383
Hawaii	200	73	1,090	75	15
Massachusetts	110	35	193	50	6
New Jersey	225	21	3,852	800	180
New York	205	40	4,289	520	107

State	Yield (CWT) [1]	Price ($/CWT)	Value Of Production ($1,000)	Acres Harvested	Total Production (1,000 CWT)
North Carolina	135	21	839	305	41
United States	258	27	40,022	5,840	1,506

Sources: Crop Summary (USDA NASS, 2001-2002); Agricultural Prices (USDA NASS, 2001-2002).
http://www.nass.usda.gov/QuickStats/Create_Federal_All.jsp.
1. A CWT is equal to 100 pounds.
2. California yield and price based on "Sample Costs to Produce Eggplant, 2005," University of California Cooperative Extension, Page 4, http://coststudies.ucdavis.edu/outreach/cost_return_articles/eggplantamvs2005.pdf.
Note, NASS discontinued collection of eggplant production data in 2002.

Fumigant Use

The following section provides a summary of our understanding of the use of fumigants in eggplant production. In preparing this summary, we referred to the available pesticide use data for the period 2000 to 2005. Our estimates of fumigant use in California eggplant production are based on California Department of Pesticide Regulation, Pesticide Use Reports (PUR). Fumigant use in other states is based on the CropLife 2002 Pesticide Use Database, and submissions for Critical Use of Methyl Bromide under the Montreal Protocol.

Pesticide use data from the CropLife 2002 Pesticide Use Database and from the submissions for Critical Use of Methyl Bromide are not collected using standard survey methods. For this reason, we are unable to gauge the accuracy of the data, but have reviewed each of the sources carefully and have used what we concluded to be the most appropriate and accurate information. Thus, the data provided below reflects an element of professional judgment. It may therefore be difficult to independently calculate the same estimates of fumigant use. Nonetheless, the information is intended to provide an indication of the scale of regulatory impacts, not to calculate the exact values of these impacts.

As shown in Table 2, eggplants are fumigated with chloropicrin, methyl bromide, metam-sodium, and 1,3-dichloropropene. Applied in combination, chloropicrin and methyl bromide are applied to 11% of the eggplant crop in California, 90% in Florida, and 70% in Georgia. An estimated 16% of the eggplant crop in California is treated with metam-sodium, and less than 5% of the California crop is treated with 1,3-dichloropropene, either alone or in combination with chloropicrin.

Over 500 thousand pounds of fumigants are used on eggplant per year in the U.S. In total, almost 50% of the U.S. eggplant crop is treated with one or more fumigant.

Table 2. Fumigant Use on Eggplant.

Active Ingredient	% Acres Treated[1]	Acres Treated	Pounds Applied
California			
Chloropicrin	11	150	15,000
Dichloropropene	<5	50	5,000
Metam-sodium	16	250	40,000
Methyl Bromide	10	150	30,000
Florida			
Chloropicrin	90	1,500	260,000
Methyl Bromide	90	1,500	100,000
Georgia			
Chloropicrin	70	550	75,000
Methyl Bromide	70	550	35,000

Source: Data for California is based on the California PUR http://www.cdpr.ca.gov/docs/pur/purmain.htm). Data for Florida and Georgia are based on the CropLife 2002 Pesticide Use Database and submissions for Critical Use of Methyl Bromide under the Montreal Protocol.
Note that percent crop treated data were taken from the above data sources. Total area treated and pounds applied are calculated using acreage from Table 1.

Based on crop production regions and the fumigant use patterns, in this document we assess the benefit of fumigant use on eggplant grown in California and the Southeast U.S. (Florida and Georgia).

FUMIGATION CHARACTERISTICS

Target Pests

As shown in Table 3, fumigants are used in California and the Southeastern States of Florida and Georgia to control several nematodes, weeds, and diseases in eggplant production. In California, methyl bromide, metam-sodium, and, to a lesser extent, 1,3-dichloropropene are applied pre-plant to control primarily root-knot and stubby-root nematodes. Heavy infestations of root-knot nematodes can cause significant reduction in crop stand and in the growth and yield of plants, while stubby-root nematode can reduce growth and yield. In the low desert region, some fields are fumigated with methyl bromide to control root diseases. The fumigation also controls most of the weed problems, obviating the need to use herbicides (Crop Profile for Bell Peppers in California, 2000). This information is primarily based on California peppers, a closely related vegetable production system with a similar life history and pest vulnerability. In Florida and Georgia, methyl bromide and chloropicrin are applied, at least two weeks prior to planting transplants, for control of soil insects, pathogens, nematodes and weeds (especially nutsedges), all of which are major pests in eggplant production (Crop Profile for Eggplant in Florida, 2000).

Table 3. Key diseases, Pests, and weeds

REGION	KEY DISEASES, PESTS AND WEEDS
California	Crown and root rots caused by soil-borne fungi, particularly *Phytophthora capsici, P. parasitica*, *Rhizoctonia* spp, *Verticillium* spp, and *Pythium* spp. Plant-parasitic nematodes, primarily root knot (*Meloidogyne* spp.)
Florida and Georgia	Yellow and purple nutsedge (*Cyperus esculentus, C. rotundus*), nightshade (*Solanum* spp.), white clover (*Trifollium repens*), ragweed (*Ambrosia artemisifolia*); Plant-parasitic nematodes (*Meloidogyne incognita; Pratylenchus* sp.)*;* Pythium root and collar rots (*P.irregulare, P. myriotylum, P. ultimum, P. aphanidermatum*); crown and root rot (*Phytophthora capsici*), Southern blight (*Sclerotium rolfsii*)*;* damping-off (*Rhizoctonia solani*, *Pythium* spp.), white mold (*Sclerotinia sclerotiorum*)

Use Characteristics

Tables 4 and 5 provide information characterizing typical fumigant use in eggplant production.

Table 4. Fumigant Application Information Eggplant Grown In California

Application Rate (lb ai/acre)[1]	**chloropicrin**	50 to 100 pounds per acre
	dichloropropene	100 pounds per acre
	metam-sodium	160 pounds per acre
	methyl bromide	200 pounds per acre
Acres Treated per Day		10 to 40 acres per tractor
Time of Fumigation		Oct – Dec
Application Method		Primarily shank injected under tarp
Application Type		Primarily strip treated with 60% of area treated?
Tarps or Water Caps		HDPE tarp

1. Typical application rate range, based on California Department of Pesticide Regulation, Pesticide Use Reporting, http://www.cdpr.ca.gov/docs/pur/purmain.htm.

Table 5. Fumigant Application Information Eggplant Grown In Georgia and Florida

Application Rate (lb ai/acre)	**chloropicrin**	50 to 75 pounds per acre
	methyl bromide	125 to 175 pounds per acre
Acres Treated per Day		10 to 40 acres per tractor
Time of Fumigation		GA – July FL – Aug. – Jan.
Application Method		Shank injected under tarp
Application Type		Primarily strip with 58 % of area treated
Tarps or Water Caps		LDPE with some HDPE and metalized tarps

PEST CONTROL PRACTICES

Chemical Control Practices

Methyl bromide/chloropicrin fumigation has been the preferred method of disease and nematode control in Florida eggplant production (Mossler and Nesheim, 2003). Fungicides, especially maneb, sulfur, and copper hydroxide, are also applied to eggplant. Maneb and copper hydroxide are used to control blotches, blights, spots, and rots. Other fungicides that may be used in eggplant production include copper sulfate, chlorothalonil, acibenzolar, azoxystrobin, copper octanoate, and trifloxystrobin.

Cultural Control Practices

Planting in well-drained soils and avoiding planting in fields with large amounts of decomposed plant debris are recommended cultural controls for damping-off. Management practices for *Phytophthora* in transplant production areas include the use of pathogen-free and fungicide-treated seeds and sterile potting media. Flats, plug trays, benches, seeding equipment, and plant house structures should be disinfected using a sodium hypochlorite solution or other disinfectant. Steam sterilization of flats and plug trays may also be useful. Transplant trays with infected plants should be removed immediately from production sites. Workers should disinfest their hands after contact with infected plants. Planting sites should be well drained and free of low-lying areas. Field drainage areas should be kept free of solanaceous weeds and volunteer crop plants (Mossler and Nesheim, 2003).

Cultural control practices, while highly useful, by themselves seldom provide technically or economically effective control of key pest problems. Many pests are long lived and crop rotation is not an economic alternative. A totally organic production system is not feasible for areas with moderate to high pest pressure. In 2005 only 4.6% of U.S. vegetable production was grown organically (USDA ERS 2006). Crop rotation is not effective for managing *Phytophthora capsici* because this pathogen can survive several years in the soil and infect more than 50 plant species. Research at Cornell (Jahn 2004), funded by the California Pepper Commission from 2001 through 2004, has shown that it may be possible to breed resistance to *Phytophthora capsici* into pepper plants that already have crown blight and root rot tolerance. While this research was not conducted on eggplant specifically, the results are from a closely related vegetable production system with a similar life history and pest vulnerability.

BENEFITS OF FUMIGATION

Yield and Quality

The following pepper trials describe yield and quality impacts that would likely result if chloropicrin, metam-sodium, and methyl bromide were no longer available in California and Southeastern U.S. eggplant production. In the absence of useful crop loss data for eggplant, this assessment relies to a large extent on relevant information available for peppers, a closely related

vegetable production system with a similar life history and pest vulnerability. Table 8 summarizes the expected impacts.

California

In 1999 researchers in California conducted six weed control trials (Smith & Mullen 1999). The standard combination of napropamide plus bensulide was compared to s-metolachlor, halosulfuron, and rimsulfuron. S-metolachlor (1.27 to 1.59 lb ai/acre) provided good control of nightshade, shepherdspurse, sow thistle, and yellow nutsedge. Halosulfuron (0.031 to 0.062 lb ai/acre) provided good weed control but was phytotoxic to peppers in all trials in which it was tested.

A field experiment was conducted in New Mexico in 1995 and 1996 to examine the effects of different irrigation methods on yields and *Phytophthora* root rot disease of chile pepper plants (*Capsicum annum* New Mexico '6-4') (Xie et al., 1999). Three irrigation methods, daily drip, 3-day drip, and alternate row furrow irrigation, were applied to plots infested with *P. capsici* and uninfested plots. For both years, the drip irrigation (either daily or 3-day) created higher marketable green pepper yields than the alternate row furrow irrigation ($p < 0.05$), and the yields between the daily and 3-day drip irrigation were statistically similar. The effect of irrigation on marketable combined yields was similar to that on green chile yields. In 1995, root rot disease incidence in the infested plots was significantly higher under alternate row furrow irrigation than for daily and 3-day drip irrigation. There was no disease development in the uninfested plots regardless of the irrigation method. The disease decreased green chile yield by 55% ($p < 0.1$), and combined yield (green + red chile) by 36% ($p < 0.1$) in 1995 compared to that in uninfested plots in alternate row furrow irrigation. In 1996, however, no disease occurred in any treatment. The results suggested that drip irrigation increases chile yield through providing either favorable soil moisture conditions or unfavorable conditions for *Phytophthora* propagation.

Southeast U.S.

Nematode problems in eggplant are similar to those in tomato and pepper, where root damage leads to reduced rooting volume and reduced water and nutrient uptake. Eggplant varieties produced in Florida are susceptible to sting, stubby-root, and root-knot nematode (Crop Profile for Eggplant in Florida, 2000). On peppers, for instance, fruit size and numbers per plant can be greatly reduced, and yield losses of 30 to 80 percent are not unusual in soils heavily infested with *Meloidogyne iincognita* (Mossler et al., 2006 and Noling 2005).

Yellow nutsedge, a weed commonly present in Florida vegetable fields, may substantially reduce crop yields when not controlled. Soil fumigation with methyl bromide effectively controls nutsedges, but methyl bromide is being phased out of production and use in the United States. An experiment was conducted during four seasons (spring and fall of 1999 and 2000) to determine the tolerance of bell pepper grown at two in-row spacings (23 and 31 cm) to interference resulting from planted yellow nutsedge tuber densities (0 to 120 tubers/m^2). Relative to yields with no nutsedge, pepper fruit yields in each season were reduced 10% with fewer than 5 nutsedge tubers/m^2. Yield losses increased more rapidly with an increase in initial nutsedge density from 0 to 30 than from 30 to 120 tubers/m^2. With 30 nutsedge tubers/m^2, large

fruit yield was reduced 54 to 74% compared to that with no nutsedge. Nutsedge shoots overtopped the pepper plants as early as 6 weeks after treatment when, with 15 tubers/m^2, nutsedge interference reduced pepper plant biomass by 10 to 47%. In the absence of methyl bromide, weed control strategies with high efficacy against yellow nutsedge will be needed for bell pepper production.

Table 6. Eggplant Yield Loss Data[1]

ALTERNATIVE	TYPE OF PEST TESTED	RANGE OF YIELD LOSS	BEST ESTIMATE OF YIELD LOSS
1,3 dichloropropene + chloropicrin	Nutsedges, fungal pathogens - FL	20 - 100	29 %
Metam-sodium (with or without chloropicrin)	Nutsedges, fungal pathogens - FL	30 - 55	44 %
No fumigation	Nutsedge in Florida (Motis, 2003)	54 to 74	64 %
No fumigation	Phytophthora root rot in New Mexico(Xie et al., 1999)	36 - 55	45 %
No fumigation but with mefenoxam Fungicide	Phytophthora root rot in Michigan (Hausbeck, 2006)	5 - 42 20% with mefenoxam	5 to 20 %
No fumigation	Phytophthora capsici in California (Cal Pepper, 2005)	49 %	49 %
No fumigation	Weeds in Connecticut (Ashley, 1999)	0.5 - 97	49 %
No fumigant	*Meloidogyne incognita* in Florida (Noling, 2005)	30 - 80	55 %
OVERALL LOSS ESTIMATE FOR ALL ALTERNATIVES TO PESTS			**California 5 to 49 % Southeast 29 to 44 %**

[1]Data extrapolated from yield loss data available for peppers.

Economic Benefits

In the following section we value the benefit of fumigant use in eggplant production. This is done by comparing current eggplant production to eggplant production without the use of fumigants, the result of which is reduced yields and changed production costs.

BEAD's estimates of the benefits of the soil fumigants, conceptually, are the improvements in production and/or reductions in cost resulting from the pesticide's use. The benefits of a fumigants use are shared between users of the pesticide, i.e., eggplant producers, and consumers of eggplant and eggplant products. Consumers benefit because higher production and/or lower costs may translate into a cheaper and more abundant supply of eggplant.

BEAD uses a partial budget analysis to estimate the impacts of changes in yields and production costs. That is, we evaluate the consequences on a typical acre of the crop grown, rather than

attempt to assess the impacts in the context of a whole enterprise, which could include multiple crops under cultivation. This approach allows the Agency to compare losses to net operating revenue, which is defined as the difference between gross revenue and variable operating costs, on a per-acre basis. The analysis ignores fixed costs, which are highly dependent on land ownership and the size and diversity of the grower's operation, and therefore difficult to define on a per-acre basis. As such, this analysis may understate the impacts as a percentage of the grower's income.

In the absence of yield loss data specific to eggplant, yield loss data used in this analysis has been extrapolated from yield loss data available for peppers. This represents an uncertainty in the analysis. The estimated benefits of fumigant use in California and southeastern states of Florida and Georgia eggplant production are summarized in Tables 7 and 8.

California

Without the use of metam-sodium, California eggplant producers would switch to a combination of 1,3-dichloropopene and chloropicrin. This would lead to yield losses of between 5 and 20% and losses in net revenues of between 9 and 35%. Higher losses would affect those fields with higher pest infestation levels. Growers experiencing these upper bound losses would likely not be able to sustain eggplant production. If chloropicrin is also no longer available, growers would experience yield losses of 49% and 78% of net revenue. This is an unsustainable loss that would lead growers to cease the production of eggplant. These conclusions apply to that part of the California eggplant acreage that is treated with one or more of the fumigants, about 20% or 300 acres (Table 2).

If eggplant is no longer produced on these acres, the lost value of production would be about $5 million and 150 thousand CWT of eggplant production annually (Table 2). Given that eggplant acreage can be put to a different use, such as producing a different crop, these losses may ultimately be somewhat less.

Table 7. Per Acre Gross Revenue, Operating Costs, and Net Operating Revenues, for Metam-sodium and Alternatives Use on California Eggplant, Fresh Market.

	Metam-sodium	1,3 dichloropropene + chloropicrin	No Fumigation
Yield (CWT)	490	466 – 392	250
Price per CWT	$33	$33	$33
Gross Revenue	$15,925	$15,129 - $12,740	$8,122
Fumigation Costs	$175	$200	$0
Estimated Yield Loss	0%	5% - 20%	49%
Growing Period Costs	$2,168	$2,193	$1,993v
Harvest Costs	$10,671	$10,137 - $8,537	$5,442
Total Operating Costs	$12,839	$12,330 - $10,730	$7,435
Net Operating Revenue	$3,086	$2,798 - $2,010	$7,435
Percentage Change in Net Operating Revenue	0%	9% – 35%	78%

Source: U.C. Cooperative Extension, 2005 Sample Costs to Produce Eggplant, San Joaquin Valley , Prepared by Richard Molinar, et al., http://www.agecon.ucdavis.edu/.
1. Includes the cost of fumigant and labor.

Southeast U.S.

Without the use of methyl bromide plus chloropicrin, Florida and Georgia eggplant producers would switch to a combination of 1,3-dichloropopene, chloropicrin, and two herbicide applications. In south Florida, growers are using an initial application of metam potassium followed by oxamyl chemigation, later in the season (PMSP, 2004). This would lead to yield losses of between 29 and 55% and losses in net revenues of greater than 100%. Higher losses would affect those fields with higher pest infestation levels. Growers experiencing these losses would not likely be able to sustain eggplant production. If chloropicrin is also no longer available, growers would experience even greater yield losses. These conclusions apply to that part of the Florida and Georgia eggplant acreage that is treated with one or more of the fumigants, about 80% or 2,000 acres (Table 2).

If eggplant is no longer produced on these acres, lost annual production would be valued at about $16 million and be approximately 500 thousand CWT of eggplant (Table 2). Given that eggplant acreage can be put to a different use, such as producing a different crop, these losses may ultimately be somewhat less.

Table 8. Per Acre Gross Revenue, Operating Costs, and Net Operating Revenues for Methyl Bromide Plus Chloropicrin and Alternatives Use on Southeastern U.S. Eggplant, Fresh Market.

	Methyl bromide + chloropicrin	**1,3 dichloropropene + chloropicrin + s-metolachlor + halosulfuron[1]**	**s-metolachlor + halosulfuron (no Fumigation) [1]**
Yield (CWT)	255	181 – 115	92
Price per CWT	$32	$32	$32
Gross Revenue	$8,160	$5,794 - $3,672	$2,938
Fumigation Costs, Weeds and Soil Borne Disease	$736	$303	$303
Non-Fumigant Alternatives Costs	$0	$50	$50
Estimated Yield Loss	0%	29% - 55%	64%
Growing Period Costs	$4,715	$4,332	$4,029
Harvest Costs	$3,990	$2,833 - $1,796	$1,436
Total Operating Costs	$8,705	$7,165 - $6,127	$5,465
Net Operating Revenue	($545)	($1,371) - ($2,455)	($2,528)
Percentage Change in Net Operating Revenue	0%	152% - 351%	364%

Source: University of Georgia, Economic Analysis of Pepper Production, Marketing and Management in Georgia, September 2005, www.ces.uga.edu/Agriculture/agecon/; Florida, Georgia, and Southeast U.S. Methyl Bromide Critical Use Nomination, 2006.

1. Does not include additional costs of application for s-metolachlor + halosulfuron.

Note, Cost data from Florida is used as a proxy for the Southeast U.S. eggplant production region as a whole. Eggplant production in the Southeast U.S. is typically followed by a second crop, which also derives benefit from fumigation. This second crop is not represented in this table.

National Impacts

There are over 5,800 acres of eggplant grown in the U.S. annually. If fumigants are no longer available to eggplant producers who currently rely on them for disease, weed and nematode control, given the magnitude of expected yield losses, U.S. eggplant production would be severely impacted. Approximately one half of eggplant producing acres would be impacted, potentially reducing U.S. eggplant production by 50%, or by approximately $20 million annually. Again, eggplant acreage could be put to a different use, such as producing a different crop, so these losses could be somewhat less.

Given that fumigants are needed in eggplant production for up to 50% of eggplant acreage, it is likely that consumer prices for eggplant would increase. This increase in consumer prices might offset some of the impacts on growers. We are unable to quantify this effect.

CONCLUSIONS

This assessment measures the benefit of chloropicrin, metam-sodium, and methyl bromide use for the control of nematodes, weeds, and soil borne disease in U.S. eggplant production. Fumigants are used in Florida and Georgia, where chloropicrin in combination with methyl bromide is applied to over 2,000 acres of eggplant, which is about 80% of the acres grown. Approximately 20% of California eggplant acreage is fumigated with methyl bromide and chloropicrin or metam-sodium. In total, nearly half of U.S. eggplant production (2,500 acres) is fumigated. These target pests may cause yield losses of 5 to 20 percent in California and 29 to 55 percent in Georgia and Florida without the benefit of fumigation. Given these losses, BEAD anticipates that the total value of U.S. eggplant production would decrease by about 50% or $20 million.

LIMITATIONS TO ASSESSMENT

This document presents the assessment of the benefits provided by the soil fumigants in the production of eggplant. The following are limitations of this analysis:

- The assessment does not account for transition to new agronomic practices such as a conversion to greenhouse production, introduction of new growing areas, or the introduction of newer as yet unregistered fumigants.

- The assessment is based on partial budget analysis and does not account for price or income distribution effects resulting from changes in supply.

- Because there are no available crop loss data specific to eggplant, this assessment is based on crop loss estimates available for pepper production, which represents an uncertainty in the assessment.

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