**NOMINATING PARTY:** The United States of America

**FILE NAME:** USA CUN11 SOIL **STRAWBERRY NURSERY** Open Field

**BRIEF DESCRIPTIVE TITLE OF NOMINATION:**
Methyl Bromide Critical Use Nomination for Preplant Soil Use for Strawberry Nursery in Open Fields (Submitted in 2009 for 2011 Use Season)

**CROP NAME (OPEN FIELD OR PROTECTED):** Strawberry Nursery Open Field

**QUANTITY OF METHYL BROMIDE REQUESTED:**

**TABLE 1: QUANTITY OF METHYL BROMIDE REQUESTED IN EACH YEAR OF NOMINATION**

| Year | NOMINATION AMOUNT |
|---|---|
| **2011** | **7,381 kilograms** |

**NOMINATING PARTY CONTACT DETAILS:**


Contact Person: Hodayah Finman
Title: Foreign Affairs Officer
Address: Office of Environmental Policy
U.S. Department of State
2201 C Street, N.W. Room 2658
Washington, D.C. 20520
U.S.A.
Telephone: (202) 647-1123
Fax: (202) 647-5947
E-mail: finmanhh@state.gov


*Following the requirements of Decision IX/6 paragraph (a)(1) The United States of America has determined that the specific use detailed in this Critical Use Nomination is critical because the lack of availability of methyl bromide for this use would result in a significant market disruption.* ■ *Yes* ☐ *No*

Signature _____ Name _____ Date _____

Title: _____

*(Details on this page are requested under Decision Ex. I/4(7), for posting on the Ozone Secretariat website under Decision Ex. I/4(8).)*

*In assessing nominations submitted in this format, TEAP and MBTOC will also refer to the original nomination on which the Party's first-year exemption was approved, as well as any supplementary information provided by the Party in relation to that original nomination. As this earlier information is retained by MBTOC, a Party need not re-submit that earlier information.*

## CONTACT OR EXPERT(S) FOR FURTHER TECHNICAL DETAILS:


Contact/Expert Person: Jack Housenger
Title: Director (Acting)
Address: Biological and Economic Analysis Division
Office of Pesticide Programs
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, N.W. Mailcode 7503P
Washington, D.C. 20460
U.S.A.
Telephone: (703) 308-8200
Fax: (703) 308-7042
E-mail: Housenger.Jack@epa.gov


## LIST OF DOCUMENTS SENT TO THE OZONE SECRETARIAT IN OFFICIAL NOMINATION PACKAGE:

| **1. PAPER DOCUMENTS: Title of paper documents and appendices** | **No. of pages** | **Date sent to Ozone Secretariat** |
|---|---|---|
| USA CUN11 SOIL STRAWBERRY NURSERY Open Field | 11 | |
| | | |
| | | |
| | | |
| **2. ELECTRONIC COPIES OF ALL PAPER DOCUMENTS: *Title of each electronic file (for naming convention see notes above)** | **No. of kilobytes** | **Date sent to Ozone Secretariat** |
| USA CUN11 SOIL STRAWBERRY NURSERY Open Field | | |
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* Identical to paper documents

# METHYL BROMIDE CRITICAL USE RENOMINATION FOR PREPLANT SOIL USE (OPEN FIELD OR PROTECTED ENVIRONMENT)

## STRAWBERRY NURSERY

## 1. SUMMARY OF THE NEED FOR METHYL BROMIDE AS A CRITICAL USE

Methyl bromide has been the long-time standard in nurseries for the treatment of soils to achieve pest-free certification of nursery stock. Currently in California, only methyl bromide and 1,3-D are accepted treatments for nursery stock certification (e.g., CDFA, 2003—NIPM #7). The use of 1,3-D is limited to soils where soil moisture and texture are amenable to nematicidal activity. In North Carolina and Tennessee specific fumigants that are accepted for certification are not identified in the regulations (NCDA, 1985; TDA, 1999). However, the long-time experience with methyl bromide as the only fumigant used has resulted in a lag in the identification of effective alternatives, and protocols for their use, that can be relied on the ensure stock certification.

Research has indicated that iodomethane/chloropicrin, 1,3-D/chloropicrin followed by dazomet, and chloropicrin followed by dazomet provided similar pest control in runner nurseries when compared to methyl bromide/chloropicrin (e.g., Fennimore et al., 2008a; Kabir et al., 2005). In addition, use of high barrier films has improved efficacy of alternatives. However, to attain certification of transplants, commercially feasible protocols must be developed and tested and sanctioned by state regulators. These alternatives will require further study to show their consistency in providing control of yellow and purple nutsedge (*Cyperus esculentus*, *C. rotundus*) and a number of other critical weed pests in California. In addition, regulatory restrictions in California on the use of 1,3-D and chloropicrin make their use as alternatives uncertain. Therefore, until commercial trials support research study findings, the nursery industry has a critical need for methyl bromide.

California runner nurseries produce the largest number of strawberry plants in the world. Transplants produced in California are distributed widely throughout the U.S. and other countries. Transplants are grown over a five-year cycle. Screenhouses are used during the first two years and open field plantings are used during the last three years. Methyl bromide is used on soils in production Year-2 though Year-5. Individual planting sites are planted to strawberries once every three years. The fourth and fifth production years account for 22% and 77%, respectively, of the current methyl bromide nursery usage in California. Several pathogens cause significant disease problems for nursery plants in California including, Phytophthora crown and root rots (*Phytophthora* spp.), red stele (*Phytophthora fragariae*), Verticillium wilt (*Verticillium dahliae*), and anthracnose (*Colletotrechum acutatum*). In addition, numerous nematode and weed species can cause severe problems.

Southeastern U.S. nurseries in North Carolina and Tennessee produce transplants in open fields. An individual field is planted to strawberries once every three years. Approximately 85% of transplants produced are sent to Florida. Currently, all nurseries in this region use methyl bromide + chloropicrin, which is shank injected 30-45 cm below the soil surface. It is broadcast

(50%) or strip fumigated (on 55% of a total acre). In the southeastern region, yellow nutsedge (*Cyperus esculentus*) and purple nutsedge (*Cyperus rotundus*) infest approximately 50% of nursery land, while all nurseries are affected by black root rot (*Rhizoctonia* and *Pythium* spp.) and root-knot nematodes (*Meloidogyne* spp.).

## 2. SUMMARIZE WHY KEY ALTERNATIVES ARE NOT FEASIBLE

Nurseries currently use methyl bromide on all of their land for transplants designated as quarantine pre-shipment (QPS), which makes up 99% of methyl bromide use by nurseries. Last year, for the 2010 use season, a critical use for methyl bromide was nominated for 18 ha of nurseries in California and 11 ha (total) for nurseries in North Carolina and Tennessee. For the 2011 season, methyl bromide continues to be critical for strawberry nurseries to produce pest-free plants to meet state and foreign certification standards, as well as the expectations of strawberry fruit producers. The regulatory restrictions in California on 1,3-D and chloropicrin make their feasibility as alternatives uncertain.

Protocols for the commercial use of effective alternatives have not been sufficiently developed to provide confidence for effective control of the key pests that would ensure certification. There are no markets for plants that do not meet the certification standards, which mean that losses up to 100% are possible when inadequate pest control occurs. Failure to adequately manage pests in transplants will jeopardize certification process and adversely affect fruit production industries in the U.S., as well as the in countries purchasing U.S. plants (e.g., Canada, Mexico, Spain, countries in South America, and others).

## 3. IS THE USE COVERED BY A CERTIFICATION STANDARD?

The certification requirements for strawberry nurseries (e.g., CDFA, 2003; TDA, 1999; NCDA, 1985) located in the states requesting critical use exemptions for methyl bromide are strict (zero tolerance for any damaging diseases and plant-parasitic nematodes) in order to minimize the prospect of spreading these pests to other states and countries where these plants are shipped. Methyl bromide has been the long-time standard for these nurseries to attain certification. State authorities may determine appropriate measures to achieve pest-free designation. California describes methods to prepare field soils using methyl bromide or 1,3-D (CDFA, 2003—NIPM #7).

The southeastern nursery consortium requested critical use of methyl bromide for strawberry nurseries in North Carolina and Tennessee. As in California, state regulatory authorities in North Carolina and Tennessee determine if nurseries have met appropriate standards for stock certification (see cited regulations below). Regulations specify that plants must be "essentially free of insect pests and plant diseases". According to a previous SE strawberry nursery request for methyl bromide use in 2010, "*it will likely take 3 to 5 years for this industry to adopt methyl iodide:chloropicrin as an effective nursery fumigant for control of diseases, nematodes and weeds (e.g. nutsedge)*."

A summary of some certification standards are provided below:

**CALIFORNIA** (CDFA, 2003)

California regulations (e.g., CDFA, 2003—NIPM #3) for nursery standards (reg. 3060.2-a) include:

*"All nursery stock shall be kept 'commercially' clean with respect to established pests of general distribution. Commercially clean shall mean that pests are under effective control, are present only to a light degree, and that only a few of the plants in any lot or block of nursery stock or on the premises show any infestation or infection, and of these none show more than a few individuals of any insect, animal or weed pests, or more than a few individual infestations of any plant disease."*

**TENNESSEE** (TDA, 1999)

*"No strawberry plants shall be sold, offered, stored, or held for sale, or transported within or into the State of Tennessee unless they shall have been certified as being essentially free of insect pests and plant diseases by the Director of Entomology and Plant Pathology of the Tennessee Department of Agriculture or by a legally constituted agency designated for such purpose in other states, territories, or counties."*

*"Soil in Foundation planting sites shall be fumigated or otherwise sterilized using materials and methods prescribed or accepted by the Director of Entomology and Plant Pathology of the Tennessee Department of Agriculture."*

**NORTH CAROLINA** (NCDA, 1985)

**02 NCAC 48A .1207 NURSERY INSPECTION AND RECORD-KEEPING**
*(a) A plant inspection certificate shall be issued after the nursery has been inspected by an inspector of the North Carolina Department of Agriculture, found apparently free of injurious plant pests, and the proper fee paid. An inspection shall be conducted at least once annually prior to September 30 of each year. The certificate shall be valid until September 30 of the following year, but may be revoked or suspended for cause in accordance with the provisions of G.S. Chapter 150B. (b) A nursery registration certificate shall be issued after the nursery has been inspected by an inspector of the North Carolina Department of Agriculture, found apparently free of injurious plant pests, less than one acre in size, and the proper fee paid. An inspection shall be conducted at least once every three years. Registration may be revoked or suspended for cause in accordance with the provisions of G.S. Chapter 150B. A person who holds a nursery registration certificate shall immediately report to the Plant Industry Division any changes in acreage or shipping procedures when such changes result in their being placed in a different nursery classification, (i.e. an increase in business size to one acre or more or out-of-state sales). (c) All nurserymen may be required to keep accurate records of plant acquisitions and sales when such records are deemed necessary by the Plant Pest Administrator in order to trace the spread of plant pests. The records shall be presented upon request to any authorized inspector.*
*Authority G.S. 106-65.45; 106-65.46; 106-284.18; 106-420; Eff. January 1, 1985.*

**02 NCAC 48A .1210 INFESTED STOCK IN NURSERY**

*When nursery stock in the nursery is found by the inspector to be infested with any plant pest, the certificate may not be issued until the infested stock has been treated or destroyed to the extent that the salable stock to be covered by the certificate shall be apparently free of plant pests. The authorized inspector making the inspection may prescribe such treatment as may be necessary and shall require full compliance before issuing a certificate. Should it be necessary for the inspector to make additional visits to the nursery to check compliance with recommended procedure, charges may be assessed for each subsequent visit on the same basis as for the initial inspection.*

*Authority G.S. 106-65.45; 106-65.46; 106-284.18; 106-420; Eff. January 1, 1985.*

## 4. IF PART OF THE CROP AREA IS TREATED WITH METHYL BROMIDE, INDICATE THE REASON WHY METHYL BROMIDE IS NOT USED IN THE OTHER AREA, AND IDENTIFY WHAT ALTERNATIVE STRATEGIES ARE USED TO CONTROL THE TARGET PATHOGENS AND WEEDS WITHOUT METHYL BROMIDE THERE.

All nurseries currently treat soils with methyl bromide. This nomination is only for a portion of nursery soils that produce transplant requiring methyl bromide but not designated QPS.

## 5. WOULD IT BE FEASIBLE TO EXPAND THE USE OF THESE METHODS TO COVER AT LEAST PART OF THE CROP THAT HAS REQUESTED USE OF METHYL BROMIDE? WHAT CHANGES WOULD BE NECESSARY TO ENABLE THIS?

As previously stated, until commercial use of alternatives has been proven to provide acceptable pest-free status, methyl bromide is critical. Research has indicated that several alternatives have comparable efficacy to methyl bromide, but transfer of research technology to commercial application will not be finalized by 2011.

## 6. SUMMARY OF RECENT RESEARCH

Research for the strawberry runner nurseries in California and North Carolina and Tennessee in the southeastern U.S. has indicated that in research plots some alternatives appear to provide pest management levels comparable to traditional methyl bromide treatments. However, the time and expense necessary to transfer new technology from the research stage to commercial application continues to result in the need for a critical use of methyl bromide for a small portion of strawberry nursery land.

Iodomethane may offer a feasible alternative to nurseries in states where it is registered (it is not currently registered in California). However, the newly registered product will require testing to confirm efficacy in commercial settings and for acceptability by state inspectors for certification. Following commercial-scale testing, a period of transition from methyl bromide also will be

required. Transition will include optimization of use rates and application techniques, and product formulation decisions.

Previous research (e.g., Larson and Shaw, 2007) suggested that inconsistent efficacy of alternatives remains the greatest problem for transition to alternatives by this industry (this was also the case for nurseries in Spain; see, Garcia-Mendez et al., 2007). Alternatives that have been evaluated in research trials over the past several years are 1,3-D + chloropicrin, 1,3-D + chloropicrin + metam-sodium, 1,3-D + metam-sodium, and dazomet as a follow-up application to 1,3-D + chloropicrin or chloropicrin (Fennimore et al., 2008b). Iodomethane is a newly registered product (not registered for use in California) and a likely long-term alternative for North Carolina and Tennessee nurseries. However, according to the registrant Arysta, data submissions still must be completed to address certification issues with this fumigant.

For the effective production of runner plants, weeds must be kept to a minimum. Recently a report on weed control was published (Fennimore et al., 2008a). Results indicated that iodomethane/chloropicrin, 1,3-D/chloropicrin followed by dazomet, chloropicrin followed by dazomet, and methyl bromide/chloropicrin all provided comparable weed control with similar hand-weeding costs. Costs of iodomethane for California nurseries were considered uncertain since it is not currently on the market for commercial use in California. Cost analyses for alternatives for California and the southeastern nurseries is presented in this document.

The industry continues to refine protocols for effective alternatives, but this requires several seasons of data gathering. For example, the use of 1,3-D/chloropicrin followed by dazomet or chloropicrin followed by dazomet appeared more effective in nursery trials in California (Kabir et al., 2005) than previous nursery trials where chloropicrin was applied alone (Larson and Shaw, 2000). By optimizing methods identified through research alternative strategies are being identified.

## 7. ECONOMIC FEASIBILITY OF ALTERNATIVES

Please note that in this study net revenue is calculated as gross revenue minus operating costs. This is a good measure as to the direct losses of income that may be suffered by the users. It should be noted that net revenue does not represent net income to the users. Net income, which indicates profitability of an operation for an enterprise, is gross revenue minus the sum of operating and fixed costs. Net income is smaller than the net revenue measured in this study, often substantially so. We did not include fixed costs because they are difficult to measure and verify.

The economic analysis of the strawberry nursery applications compared data on yields, crop prices, revenues and costs using methyl bromide and using alternative pest control regimens in order to estimate the loss of methyl bromide availability. The alternatives identified as technically feasible - in cases of low pest infestation[1] – for different regions by the U.S. are: (a)

[1] It should be noted that the USG does not request methyl bromide for use in areas of low to moderate pest pressure. Only cases where key pests are present at moderate to high levels require methyl bromide for pest pressure.

Iodomethane and (b) 1,3-Dichloropropene and Chloropicrin followed by Metam sodium (otherwise referred to as the Georgia 3-Way).

The economic factors that really drives the feasibility analysis for nursery stock production uses of methyl bromide are: (1) yield losses, referring to reductions in the quantity produced, (2) increased production costs, which may be due to the higher-cost of using an alternative, additional pest control requirements, and/or resulting shifts in other production or harvesting practices (3) quality losses, which generally affect the quantity and price received for the goods, and (4) missed market windows due to plant back time restrictions, which also affect the quantity and price received for the goods.

The economic reviewers then analyzed crop budgets for pre-plant sectors to determine the likely economic impact if methyl bromide were unavailable. Various measures were used to quantify the impacts, including the following:

(1) **Loss per Hectare.** For crops, this measure is closely tied to income. It is relatively easy to measure, but may be difficult to interpret in isolation.

(2) **Loss per Kilogram of Methyl Bromide**. This measure indicates the value of methyl bromide to crop production.

(3) **Loss as a Percentage of Gross Revenue.** This measure has the advantage that gross revenues are usually easy to measure, at least over some unit, *e.g.*, a hectare of land or a storage operation. However, high value commodities or crops may provide high revenues but may also entail high costs. Losses of even a small percentage of gross revenues could have important impacts on the profitability of the activity.

(4) **Loss as a Percentage of Net Operating Revenue**. We define net cash revenues as gross revenues minus operating costs. This is a very good indicator as to the direct losses of income that may be suffered by the owners or operators of an enterprise. However, operating costs can often be difficult to measure and verify.

(5) **Operating Profit Margin**. We define operating profit margin to be net operating revenue divided by gross revenue per hectare. This measure would provide the best indication of the total impact of the loss of methyl bromide to an enterprise. Again, operating costs may be difficult to measure and fixed costs even more difficult, therefore fixed costs were not included in the analysis.

These measures represent different ways to assess the economic feasibility of methyl bromide alternatives for methyl bromide users, who are strawberry nursery producers in this case. Because producers (suppliers) represent an integral part of any definition of a market, we interpret the threshold of significant market disruption to be met if there is a significant impact on commodity suppliers using methyl bromide. The economic measures provide the basis for making that determination.

In the case of strawberry fruit production, for California strawberry producers, there is a slight change in impacts from previous years estimates. Iodomethane is under registration review,

however registration is expected to be at least one year in the future. There is also the use of 1,3-D + chloropicrin followed by an application of metam sodium. The loss to gross revenue for growers using 1,3-D + chloropicrin followed by an application of metam sodium at a rate of up to 250 lb ai. as an alternative to methyl bromide is estimated to be about 11% as compared to the use of methyl bromide. California strawberry nursery growers are not expected to see any yield or quality impacts with 1,3-D + chloropicrin plus metam sodium. See Table 2 below for further details.

For the Eastern growers that have access to iodomethane, an loss 13% in gross revenue is expected in the first year of use due to increased costs to retrofit application equipment (hoses, nozzles, flow meters) that will allow the use of iodomethane. This cost is estimated to be approximately $600-$700 per treatment based on BEAD estimates. Southeastern Strawberry nursery producers that use iodomethane in place of methyl bromide are expected to experience no change in yield or quality. See Table 3 below.

**TABLE 2. CALIFORNIA STRAWBERRY GROWERS ASSOCIATION : ECONOMIC IMPACTS OF METHYL BROMIDE ALTERNATIVES.**

| CALIFORNIA SGA | METHYL BROMIDE | IODOMETHANE (UNREGISTERED) | 1,3 D + PIC + METAM |
|---|---|---|---|
| PRODUCTION LOSS (%) | 0% | 0% | 0% |
| PRODUCTION PER HECTARE | 372 | 372 | 372 |
| * PRICE PER UNIT (US$) | $ 110.23 | $ 110.23 | $ 110.23 |
| = GROSS REVENUE PER HECTARE (US$) | $ 41,019 | $ 41,019 | $ 41,019 |
| - OPERATING COSTS PER HECTARE (US$)** | $ 28,585 | $ 31,491 | $ 32,944 |
| = NET REVENUE PER HECTARE (US$) | $ 12,434 | $ 9,528 | $ 8,075 |
| LOSS MEASURES * | | | |
| 1. LOSS PER HECTARE (US$) | $ 0 | $ 2,906 | $ 4,359 |
| 2. LOSS PER KILOGRAM OF METHYL BROMIDE (US$) | $ 0 | $ 11.03 | $ 16.55 |
| 3. LOSS AS A PERCENTAGE OF GROSS REVENUE (%) | 0% | 7% | 11% |
| 4. LOSS AS A PERCENTAGE OF NET OPERATING REVENUE (%) | 0% | 23% | 35% |
| 5. OPERATING PROFIT MARGIN (%) | 30% | 23% | 20% |

**Note that the measures in the tables below must be interpreted carefully. Operating costs do not include fixed costs and net revenue equals gross revenue minus operating costs.

**TABLE 3. SOUTH EASTERN STRAWBERRY NURSERY CONSORTIUM : ECONOMIC IMPACTS OF METHYL BROMIDE ALTERNATIVES**

| South Eastern Strawberry Nursery Consortium | METHYL BROMIDE | IODOMETHANE | 1,3 D + PIC |
|---|---|---|---|
| PRODUCTION LOSS (%) | 0% | 0% | 10% |
| PRODUCTION PER HECTARE | 211,715 | 211,715 | 190,543 |
| * PRICE PER UNIT (US$) | $ .20 | $ .20 | $ .20 |
| = GROSS REVENUE PER HECTARE (US$) | $ 42,008 | $ 42,008 | $ 37,807 |
| - OPERATING COSTS PER HECTARE (US$)** | $ 29,244 | $ 34,523 | $ 31,513 |
| = NET REVENUE PER HECTARE (US$) | $ 12,764 | $ 7,485 | $6,294 |
| LOSS MEASURES * | | | |
| 1. LOSS PER HECTARE (US$) | $ 0 | $ 5,279 | $ 6,470 |
| 2. LOSS PER KILOGRAM OF METHYL BROMIDE (US$) | $ 0 | $ 12.80 | $ 15.69 |
| 3. LOSS AS A PERCENTAGE OF GROSS REVENUE (%) | 0% | 13% | 15% |
| 4. LOSS AS A PERCENTAGE OF NET OPERATING REVENUE (%) | 0% | 41% | 51% |
| 5. OPERATING PROFIT MARGIN (%) | 30% | 18% | 17% |

**Note that the measures in the tables below must be interpreted carefully. Operating costs do not include fixed costs and net revenue equals gross revenue minus operating costs.

## 8. RESULTANT CHANGES TO REQUESTED EXEMPTION QUANTITIES

**TABLE 4: NOMINATION AMOUNT**

### 2011 Methyl Bromide Usage Newer Numerical Index (BUNNI)

### Transition Use Reduction Description Spreadsheet

| SECTOR | | STRAWBERRY NURSERY | | |
|---|---|---|---|---|
| | | California Strawberry Nursery Assoc. | Southeastern Strawberry Consortium | Sector Total / Average |
| Quantity Requested for 2010: | Amount (kgs) | 4,690 | 2,691 | 7,381 |
| Quantity Recommended by MBTOC/TEAP for 2010 : | Amount (kgs) | 4,690 | - | 4,690 |
| Quantity Approved by Parties for 2010: | Amount (kgs) | 4,690 | - | 4,690 |
| | Area (ha) | 23 | - | 23 |
| | Rate | 200 | | 200 |
| **Transition from 2010 Baseline Adjusted Value** | Percentage (%) | 0% | 0% | 0% |
| **Quantity Required for 2011 Nomination:** | Amount (kgs) | **4,690** | **2,691** | **7,381** |
| | Area (ha) | **23** | **13** | **37** |
| | Rate | **200** | **200** | **200** |

## CITATIONS


California Strawberry Commission. 2008. Request for a critical use exemption the use of methyl bromide on strawberries.

CDFA (California Department of Food and Agriculture). 2003. http://www.cdfa.ca.gov/phpps/PE/Nursery/NIPM.html Regulation for nursery and seed inspection (NIPM #3), http://www.cdfa.ca.gov//phpps/PE/Nursery/pdfs/nipm_3_regs_nsy_sees_insp.pdf; Approved treatment and handling procedures to ensure against nematode pest infestation of nursery stock (NIPM #7), http://www.cdfa.ca.gov/phpps/PE/Nursery/pdfs/NIPM_7.pdf; CDFA Strawberry Registration and Certification Program, http://fpms.ucdavis.edu/Strawberry/CDFAStrawRegs.html

Fennimore, S. A., Haar, M. J., Goodhue, R. E., and Winterbottom, C. Q. 2008a. Weed control in strawberry runner plant nurseries with methyl bromide alternative fumigants. HortScience 43(5):1495-1500.

Fennimore, S. A., Duniway, J. M., Browne, G. T., Martin, F. N., Ajwa, H. A., Westerdahl, B.B., Goodhue, R. E., Haar, M., and Winterbottom, C. 2008b. Methyl bromide alternatives evaluated for California strawberry nurseries. California Agriculture 62(2):62-67. http://repositories.cdlib.org/cgi/viewcontent.cgi?article=3194&context=anrcs/californiaagriculture

Kabir, Z., Fennimore, S. A., Duniway, J. M., Martin, F. N., Browne, G. T., Winterbottom, C. Q., Ajwa, H. A., Westerdahl, B. B., Goodhue, R. E., and Haar, M. J. 2005. Alternatives to methyl bromide for strawberry runner plant production. HortScience 40(6):1709-1715.

NCDA (North Carolina Department of Agriculture and Consumer Services), 1985. Nursery Regulations, Nursery Certification. http://www.ncagr.com/plantind/Regs/48a1200.htm; http://reports.oah.state.nc.us/ncac/title%2002%20-%20agriculture%20and%20consumer%20services/chapter%2048%20-%20plant%20industry/subchapter%20a/02%20ncac%2048a%20.1210.html

TDA (Tennessee Department of Agriculture and Plant Industries). 1999. Rules of Tennessee Department of Agriculture and Plant Industries. Regulations Governing Strawberry Plant Growers and Dealers. Chapter 0080-6-2. http://state.tn.us/sos/rules/0080/0080-06/0080-06-02.pdf