

Soil Fumigants -- Oregon Reply

From: [Joe DeFrancesco](#)

Sent: Monday, August 27, 2007 9:22 AM

To: Jane M. Thomas

Cc: Rick Melnicoe

Subject: Soil Fumigants

Jane,

I can't remember if there was a need for you to respond to EPA about soil fumigants and their proposed mitigation measures. Nonetheless, I felt I should do so on behalf of the Oregon berry industries. FYI, [attached](#) is the letter I sent to the public record for the following docket.

Methyl Bromide (Docket ID: EPA-HQ-OPP-2005-0123)

1,3-Dichloropropene (Docket ID: EPA-HQ-OPP-2005-0124)

Metam Sodium/Potassium (Docket ID: EPA-HQ-OPP-2005-0125)

Dazomet (Docket ID: EPA-HQ-OPP-2005-0128)

Chloropicrin (Docket ID: EPA-HQ-OPP-2007-0350)

Original FR notice soliciting comments: May 2, 2007 (Volume 72, Number 84)][Notices] [Page 24290-24292]

Federal Register notice extending the deadline for comments: June 20, 2007 (Volume 72, Number 118)][Notices][Page 34006-34007]

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Subject: Soil Fumigants in Berry Crops

Methyl Bromide (Docket ID: EPA-HQ-OPP-2005-0123)

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I conduct pest management research at Oregon State University and also provide pest management advice and information to commercial berry growers. I submit the following comments about the role of soil fumigants in berry crops on behalf of the blueberry, caneberry (blackberry and raspberry), and strawberry industries in Oregon.

Oregon is known nationally and internationally for its high-yielding fields and high-quality berries which, also, are an important component of Oregon's agricultural economy. The following table summarizes production data for Oregon's berries in 2006.

	Harvested Acres	Total Production (million pounds)	Farm-gate Value (\$ million)	US Ranking
Blueberry	4,400	35.6	53.1	3
Red Raspberry	1,900	6.2	4.8	2
Black Raspberry	1,500	4.0	9.8	1
Blackberry*	7,560	44.0	38.7	1
Strawberry	2,100	23.0	15.9	3

* Includes hybrid berries (Boysenberries and Loganberries)

The following comments apply to all the berries and include: which fumigants are used in which crops; which pests are targeted; alternatives that may exist; and considerations of the mitigation measures USEPA is considering.

Soil Fumigants

Soil fumigants play a key role for successful fruit production in certain berry crops in some areas, especially where plant parasitic nematode populations are high. Some growers use non-chemical methods, such as cover crops, to help reduce nematode populations prior to planting. However, this method requires that a field not be planted for one or two years and most growers don't have the luxury of extra land or money to keep a field out of production.

Soil fumigants have been used safely in berry crops for many years. Nearly all applications are made by licensed soil fumigators who ensure safe application and follow-up procedures (e.g. tarp removal). Whether tarp-fumigated, or sealed by rolling or irrigating the soil after fumigation, growers do not break the seal, let people enter the fumigated area, or plant prior to the specified time required.

Nematodes are the main target when using soil fumigants and, depending on the fumigant used, other pests (soil dwelling insects, diseases, and weeds) are also controlled. Raspberries, black raspberries, blackberries and blueberries are long-lived perennials and nematode control at planting is important to help establish a planting and maintain good vigor and growth throughout the life of the planting. Oregon strawberries remain in the ground for only three to four harvest seasons but nematode control is often necessary if new strawberries are planted back into, or near, an old strawberry field.

Several genera of plant-parasitic nematodes are found in berry plantings in Oregon: the dagger nematode (*Xiphinema* spp.), the stubby root nematode (*Paratrichodorus* spp.), the ring nematode (*Mesocriconema* spp.), the spiral nematode (*Helicotylenchus* spp.), the pin nematode (*Paratylenchus* spp.), and the root-lesion nematode (*Pratylenchus* spp.). The root-lesion and dagger nematodes are the most common. Fenamiphos (Nemacur) is currently registered for use in strawberries and raspberries but does not control *Xiphinema* spp., which vectors tobacco and tomato ringspot viruses. As fenamiphos will be unavailable in 2008, and current supplies are dwindling, there is an increased reliance on soil fumigants for nematode control.

Methyl Bromide (MB) is the fumigant of choice because of its long history of success suppression and control of soil nematodes. However, with the on-going phase-out of MB, there is less available for use in berry fields. When MB is available, it is almost prohibitively expensive (\$2,000 - \$2,500 per acre); the trend is for less use of MB as the years go by. MB must be applied by a licensed soil fumigator. Tarping, tarp ripping and tarp removal is cumbersome and most often done by the fumigator. Chloropicrin is commonly added to MB for increased disease control.

1,3-Dichloropropene (Telone) is now the most widely used fumigant in Oregon berry crops due to its ease of application, good efficacy against nematodes and soil-dwelling insects, and reasonable cost (\$800- \$1,000 per acre). With the addition of chloropicrin (Telone C17 or Telone C35), which increases efficacy against soil diseases caused by *Phytophthora*, *Rhizotonia*, *Verticillium*, and others, berry growers rely on Telone for soil fumigation. The pending loss of fenamiphos in strawberries and raspberries makes Telone even more important in berry production.

Metam Sodium/Potassium (Vapam) is not widely used. It is relatively expensive and efficacy is variable; degree of effectiveness is dependent on soil type, soil moisture and application efficiency. Many cases of reported failures have caused growers to not favor use of this fumigant.

Dazomet (Basamid) is not widely used. It is very expensive (generally two to three times more expensive than Vapam) and has some of the same efficacy issues as metam sodium (appropriate depth of rototilling is critical for good efficacy). However, dazomet is very useful for spot treatments, which can be accomplished by the grower. A plant (or area of plants) is removed and the soil treated with dazomet (rototilled in); the treated soil can be replanted after waiting the appropriate amount of time.

Chloropicrin is not used alone but is added to a MB or Telone application if soil diseases are especially problematic.

Berry Crops and Fumigant Usage

Blueberries

In any given year, about 50 to 95% of new blueberry acreage is fumigated prior to planting, with nematodes being the main target. (An ancillary benefit of soil fumigation is suppression of garden symphylans, which are also present in many Oregon agricultural lands.) For the past several years, 500 to 800 acres of blueberries per year have been planted. A small crop is harvested the third year after planting but it takes about 6 years to get a full crop. Soil fumigation is very important in this high-value, long-lived crop (blueberries can be productive for more than 50 years), especially since there are no post-plant nematode treatments registered for use in blueberries. Young plants are the most sensitive to nematode damage, showing reduced vigor and growth, and sometimes death. Differences in plant growth, vigor and yield between fumigated and non-fumigated fields can be seen as long as 15 years after planting. Most growers sample the soil for nematodes prior to planting and base their decision to fumigate on test results. The action threshold for the Dagger Nematode (*Xiphinema americanum*), which is a vector for Tobacco Ringspot and Tomato Ringspot Viruses, is just one nematode per sample; if found, fumigation is usually recommended. 1,3-Dichloropropene is used on the majority of the fumigated fields, with chloropicrin added if soil diseases are suspected (planting on raised beds, incorporation of sawdust to improve drainage, and use of drip irrigation help to reduce the likelihood of soil diseases.)

Red Raspberries

Raspberries can remain productive for a long time (15 to 20 years), and nematode control is necessary to get a planting off to a good start and keep it vigorous and productive. There are only about 100 to 200 new acres of raspberries planted each year in Oregon; about 75 to 95% of all new raspberry fields are fumigated prior to planting. Telone C17 or C35 are the most common fumigants used. Nematodes are the main target. The use of fenamiphos during the life of the raspberry planting is common if soil tests show high levels of nematodes.

Raspberries are very susceptible to root rot disease caused by *Phytophthora* so chloropicrin is included in the soil fumigation treatment. While soil fumigation doesn't give long-lasting disease control, it enables the plants to get well established; fungicide applications for *Phytophthora* are common throughout the life of a raspberry planting. Incorporation of calcium sulfate into the soil prior to planting, and planting on raised beds, are practices growers use to mitigate the effects of root rot disease.

Black Raspberries

Black raspberries, also known as "black caps", remain productive for only four to eight years. They are the highest value crop of all the berry crops in Oregon, and susceptible to nematodes and wilt caused by *Verticillium*. As per red raspberries, Telone C17 or C35 is commonly used as a soil fumigant.

Blackberries

While nematodes, as well as root rot diseases, are found in blackberry plantings, the plants are so vigorous that the nematodes and diseases don't appear to affect vigor, growth or yield. It is very rare that newly planted blackberry acreage is fumigated prior to planting.

Strawberries

In any given year, there are about 1,000 acres of newly planted strawberries. Unlike California and Florida, Oregon grows strawberries in a perennial production system. After a spring planting, the fruit is not harvested until the following year (June harvest); the planting is harvested for a total of three or four years and then removed. About 50% of all new strawberry fields are fumigated prior to planting. Strawberry prices are not always very high, so fumigation costs often limit a grower from choosing pre-plant fumigation. Nematodes and soil diseases are the main targets in fumigation, with weed control an added benefit; Telone C17 or 35 are the fumigants most often used. Fenamiphos is used post-plant during the life of the planting if nematodes are present.

Mitigation Measures

Buffer Zones

Buffer zones pose a problem for most growers as it limits the size of a field (i.e. leaving an unplanted buffer zone) or forces a certain portion of a field to remain untreated with a soil fumigant. Plants in non-fumigated soil are slower to establish and can remain less vigorous and less productive than plants that are growing in fumigated soil. The effects can remain for many years after planting, resulting in reduced fruit yields for many years. Buffer zones of 30 to 60 feet would be acceptable; a buffer zone of 100 feet might be acceptable if it is only on one side of a field (i.e. the side next to public use area). A 100-foot buffer on all four sides of a field would limit where a field can be planted and would take too much valuable land out of production. Scenario-based buffer zones, using site conditions based on look-up tables, are more logical because they would be site-specific but would work only if they are simple to calculate and use; they have the potential to be cumbersome and confusing. It is not uncommon for Oregon berry fields to be at the urban-rural interface.

If a 100-foot buffer on just one side of an equal-sided, 10-acre blueberry field remained unplanted, there would be a 15% loss in land area and subsequent yield potential, which translates to about \$1,790 per acre lost revenue ($4 \text{ tons/acre} \times \$1.49/\text{lb} \times 15\% = \$1,788/\text{acre}$)

Sealing Methods

Tarp is always used with methyl bromide applications, which are done by licensed fumigators. Growers generally pay for the fumigator to rip and remove the tarp, which adds to the cost of the fumigation. Specialized equipment is needed to rip and remove the tarp; in some cases, growers may do these operations themselves, but will rent or borrow the equipment from the fumigator. Glue, and glue application, has improved and efficiently pieces together the tarp, creating a tight seal.

1,3-Dichloropropene (Telone II, Telone C17, Telone C35) is applied by licensed fumigators by shanking-in the fumigant and then compacting the soil with a roller immediately after application to create a seal. Rolling is most commonly done by the fumigator but sometime the grower will borrow the roller to complete the task. Irrigation equipment is not generally available at the time of fumigation so would be an impractical method of sealing the soil.

Block Limits

Most newly established berry fields are 20 to 40 acres in size although, occasionally, larger fields are planted (60 to 80 acres). Setting a 40 acre limit on fumigation would prove inconvenient to the grower and the fumigator; forcing at least two field visits and a waiting period between the applications. However, newly planted fields are rarely larger than 40 acres.

Since nearly all soil fumigation is done by just two or three licensed fumigators in the area (western portion of both Oregon and Washington), it would be easy to ensure that nearby growers are not fumigating within the same time period; the fumigators can coordinate amongst themselves. In addition, most of the commercial berry growers in a given area of Oregon know each other well and could discuss, amongst themselves, their plans for new plantings and fumigation needs.

Respirator Protection

Fumigators and their workers wear the necessary protective gear and respirators.

Entry-Restriction Period

Re-entry into a fumigated area before the 7 to 10 day waiting period is generally not necessary. A reasonable extension of the REI would not negatively impact grower operations.

Responsible Party


Fumigators are currently responsible for all aspects of soil fumigation and ensure that label requirements and WPSs are adequately met. Responsibility, for tasks like compacting or irrigating the soil, is already currently sometimes shared with the grower.

Notification and Posting

Posting at the field edges, and areas of ingress and egress to the field, would be sufficient to alert bystanders of any fumigation in progress.

Please don't hesitate to call or email if you have questions or if additional information is needed. Thank you for considering the needs of Oregon berry growers.

Sincerely,



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