

Application Options for 1,3-Dichloropropene Pilot Program

The Department of Pesticide Regulation (DPR) is evaluating the efficacy and practicality of several new emission reduction options for 1,3-Dichloropropene (1,3-D) applications through a pilot program in certain high-use regions of California. The objective of the pilot program is to provide growers and applicators with alternative methods of achieving emission reductions comparable to totally impermeable film (TIF) tarpaulins. Currently, both the United States Environmental Protection Agency (USEPA) and DPR offer a 60% buffer zone reduction credit when applicators employ TIF tarps in certain fumigant (e.g., chloropicrin) applications. Computer modeling conducted by DPR demonstrates that a 60% emission reduction provides at least a 60% reduction in buffer or setback distance for any given field size or application rate. Therefore, the pilot program aims to reduce emissions by at least 60% as compared to an equivalent untarped application.

To provide growers and applicators flexibility in reducing their fumigation emission potential, DPR has identified several potential 1,3-D emission reduction options. While some of these options individually offer emission reductions of at least a 60% compared to untarped fumigation methods, there are options that fall short of achieving the 60% reduction target. However, this shortfall may be compensated by a combination of additional restrictions to the application area, application rate, or larger setback distances such that emission reductions are at least 60%.

The pilot program will take place in select high-use regions located near DPR air monitoring sites in Shafter, Parlier, and Delhi where elevated detections of 1,3-D have occurred. Applicators of 1,3-D in these regions will have the option of using application methods that reduce 1,3-D emissions by at least 60% as compared to an untarped method; alternatively, applicators may choose a combination of additional restrictions to application area, application rate, or use larger setbacks to meet the emissions reduction target. The pilot program will begin in the Fall of 2020 and will run for one year.

The following application options have been identified by DPR as having the potential to achieve emission reduction targets, either alone or in combination with additional application restrictions:

1. Use of TIF tarps

- This method would require the entire application field to be covered with DPR-approved TIF tarps.
- TIF tarps greatly reduce the rate at which fumigant gas escapes from the soil, thereby decreasing emissions while increasing pest control efficacy.
- The method is well-researched and already common practice in certain areas of California; commercial application equipment and the expertise needed to correctly apply TIF is already available.

2. Pre-application moisture content of 70% field capacity (FC)

- A field is irrigated 2-3 days prior to fumigation to create a “barrier” or “cap” of soil moisture at 3-9” below the soil surface. This creates a barrier to the upward movement of fumigant, thereby slowing down emissions.
- The moisture in this 3-9” range would be required to be at 70% of “field capacity” (FC), a practical term in soil science that describes the amount of water held by a soil after excess water has drained away.
- The exact irrigation volume required to meet the 70% depends on pre-existing soil conditions and may require 2-4 inches in relatively dry soil.

3. New fumigation method consisting of an injection depth of 24” (rather than the standard 18” deep injection)

- Under this option, 1,3-D is injected to a depth of at least 24 inches below the soil surface.
- The greater depth of injection increases the amount of time the fumigant spends in the soil and reduces emissions.
- Method has potential to achieve substantial emission reductions with few additional inputs over the standard 18” injection.

- Certain fields may already include cultivation to depths below 24 inches (“deep ripping”) as part of standard practice, facilitating subsequent injection at this depth and decreasing the marginal cost of implementation.
- The method can be used in combination with other proposed application options such as TIF tarp, moisture capping, or post-application water seals for potentially greater emissions reduction.

4. Combination of 24” injection depth with a pre-application 70% field capacity moisture cap

- This option combines the emission reductions from *Options 2 and 3*, and may be necessary for larger field sizes to achieve the targeted 60% emission reduction.

5. New fumigation method consisting of a standard injection depth of 18” with 50% of the field covered with TIF (“TIF Broadcast-Strip”)

- A field is entirely fumigated at the standard deep injection depth of 18”, but rows are alternately covered or sealed with TIF (100% of the field area is fumigated: 50% will be covered by TIF, and 50% will be uncovered).
- Tarps are sealed to the ground by burying the ends approximately 10” under firmly packed soil (current standard practice).

6. Combination of 24” injection depth with 50% of the field covered with TIF

- This option combines the emission reductions from *Options 3 and 5*, and may be necessary for larger field sizes.

7. Combination of standard 18” injection depth with 70% field capacity moisture cap and 50% of field covered with TIF

- This option combines the emission reductions from *Options 2 and 5*, and may be necessary for larger field sizes.

8. Combination of pre-application moisture content of 70% field capacity with 24” injection depth and 50% of the field covered with TIF

- This option combines the emission reductions from *Options 2, 3, and 5*, and may be necessary for larger field sizes.

9. New fumigation method consisting of dual-injection depths at 18” and 30”

- This option allows for the dual injection at a depth of 18” and 30” with at least 50% of 1,3-D applied at 30” depth.

10. Combination of dual-injection method consisting of depths at 18” and 30” with 70% field capacity moisture cap

- This option combines *Option 2 and 9* and may be necessary for larger field sizes.

11. Untarped fumigation at injection depth of 18” (FFM 1206) with expanded setback distances

- Growers looking to continue use of FFM 1206, based on application rate and field size, would be required to have setback distance ranging from 200 feet to up to ¼ mile for larger applications.

12. Untarped fumigation at injection depth of 12” (FFM 1201) with expanded setback distances

- Growers looking to continue use of FFM 1201, based on application rate and field size, would be required to have setback distance ranging from 200 feet to up to ¼ mile for larger applications.

Table 1. Application block size limits (in acres) depending on application method and application rate. Number in parentheses refers to the setback distance needed to increase allowed field block size.

Application method options		Application rate (lb/ac)							
		100	110	125	150	200	250	300	332
1.	TIF (1242, 1245, 1247, and 1249)	MR	MR	MR	MR	MR	MR	MR	MR
2.	18" injection depth with 70%FC moisture cap	MR	MR	MR	MR	45 MR (200ft)	25 40 (200ft) MR (500ft)	15 25 (200ft) 65 (500ft)	10 20 (200ft) 50 (500ft)
3.	24" injection depth	MR	MR	MR	MR	MR	40 70 (200ft)	25 40 (200ft)	15 30 (200ft)
4.	24" injection depth with 70%FC moisture cap	MR	MR	MR	MR	MR	55 MR (200ft)	30 55 (200ft)	25 40 (200ft)
5.	18" injection depth with 50% of field covered with TIF ("TIF Strip")	MR	MR	MR	MR	70 MR (200ft) MR (500ft)	35 55 (200ft) MR (500ft)	20 35 (200ft) MR (500ft)	15 25 (200ft) 70 (500ft)
6.	24" injection depth with 50% of field covered with TIF	MR	MR	MR	MR	MR	MR	MR	MR
7.	18" injection depth with 70%FC moisture cap and 50% of field covered with TIF	MR	MR	MR	MR	MR	65 MR (200ft)	40 65 (200ft)	30 50 (200ft)
8.	24" injection depth with 70%FC moisture cap and 50% of field covered with TIF	MR	MR	MR	MR	MR	MR	MR	MR
9.	18" and 30" dual injection depth	MR	MR	MR	MR	45 MR (200ft) MR (500ft)	25 40 (200ft) MR (500ft)	15 25 (200ft) 65 (500ft)	10 15 (200ft) 50 (500ft)
10.	18" and 30" dual injection depth with 70% field capacity (FC) moisture cap	MR	MR	MR	MR	MR	50 MR (200ft)	30 50 (200ft)	20 35 (200ft)
11.	Untarped 18" injection depth (FFM1206) [†]	MR	65 MR (200ft) MR (500ft)	45 70 (200ft) MR (500ft)	20 40 (200ft) MR (500ft)	10 20 (200ft) 55 (500ft)	5 10(200ft) 30(500ft)	4 5 (200ft) 20 (500ft)	3 5 (200ft) 15 (500ft)
12.	Untarped 12" injection depth (FFM1201) [†]	10 20 (200ft) 55 (500ft)	10 15 (200ft) 45 (500ft)	5 10 (200ft) 35 (500ft)	4 5 (200ft) 25 (500ft)	2 4 (200ft) 10 (500ft)	2 3 (200ft) 5 (500ft)	1 2 (200ft) 5 (500ft)	NA 1 (200ft) 5 (500ft)

MR = No additional restrictions for application blocks ≤ 80 ac in addition to the 100 ft. setback for 7 d as required under current recommended permit conditions.

NA = Application not allowed.

[†]Setbacks up to ¼ mile may apply depending on desired application block size and desired application rate.