

Cold Weather Storage and Handling of Liquid Pesticides

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This MontGuide explains procedures for proper winter storage and handling of leftover liquid pesticides. Freezing of liquid pesticides can result in separation of the active ingredient from the solvents or emulsifiers, or inactivation of emulsifiers, which may lead to crystallization or coagulation of the pesticide. Applicators should know which pesticides can be frozen and which cannot. Techniques for thawing and redissolving are also important, since a pesticide, once frozen, can plug spray equipment, result in poor product performance and/or damage crops if the proper thawing and mixing procedures are not followed.

Information Sources

The cold weather storage information in this MontGuide was compiled from information obtained from manufacturers of the pesticides listed. Each manufacturer was sent a list of questions regarding correct storage methods for their pesticide(s) during sub-zero weather. The questions asked were:

- Does the product have a minimum storage temperature?
- Should freezing of the product be avoided?
- If frozen, will the active ingredient separate from the inert carriers?
- Once thawed, will the active and inert ingredients go back into suspension?
- Is agitation recommended

before the product will go back into suspension?

- Is the effectiveness of the pesticide reduced if frozen?
- Are heated or well-insulated storage facilities recommended?
- Should the pesticide applicator contact the manufacturer if the pesticide freezes?

Based on manufacturers' responses, many pesticides can freeze with no adverse effects to the pesticide, although separation of the active ingredient and solvent will occur. Certain steps must be followed before using a pesticide that has been frozen. First, the product must be thawed. Before attempting to thaw a frozen pesticide, the container should be checked to make sure that it is not ruptured or cracked from the expansion of the frozen liquid. If sound, the container should be brought to room temperature (placed in a heated room or south side of a sunny building away from children, livestock and pets) for the thawing process, which may take several days. Once the liquid has thawed, the container can be rolled, shaken or otherwise agitated to get the contents into a uniform suspension. The container should also be inverted several times to ensure the product is completely dissolved. Pesticide manufacturers caution that if a pesticide cannot be totally redissolved (crystals are still present), the pesticide should not be used. Call

the manufacturer to find out what to do with it.

Storage Conditions

In the following table, minimum storage temperature refers to the temperature required to keep the pesticide in solution. Below that temperature, the pesticide will form crystals and freeze. The freezing point of many pesticides is lower than 32°F due to the hydrocarbon solvents or inert ingredients. Pesticides that cannot be frozen must be placed in a heated or adequately insulated area to avoid sub-zero temperatures.

Wettable powders and granules, as a rule, are not affected by low temperatures. These formulations should be stored in a dry place as moisture may promote caking or lead to certain chemical changes that reduce their effectiveness. Products formulated in water-soluble bags require special winter storage. These bags have a high affinity for moisture and become brittle when frozen. If handled when brittle, bags may break open. It is important that they be stored in heated facilities.

Before storing pesticides for the winter, the applicator needs to read the pesticide label. While extreme care was taken to assure the accuracy of the information in this MontGuide, labels continue to be amended. Therefore, they should always be consulted.

Insecticides

Minimum storage temperature
Should freezing be avoided?
Will product separate if frozen?
Will product redissolve after thawing?
Is agitation recommended if frozen?
Is product efficacy reduced?
Are heated or insulated storage facilities recommended?
Should applicator contact manufacturer if product freezes?

Comments

Insecticides	Minimum storage temperature	Should freezing be avoided?	Will product separate if frozen?	Will product redissolve after thawing?	Is agitation recommended if frozen?	Is product efficacy reduced?	Are heated or insulated storage facilities recommended?	Should applicator contact manufacturer if product freezes?	Comments
Ambush 2E (permethrin)	-10°F	Yes	Yes	Yes	Yes	No	Yes	Yes	Warm to 50°F and shake well.
Asana XL (esfenvalerate)	28°F	Yes	No	Yes	Yes	No	Yes	Yes	Avoid freezing the product.
Attack Soap Concentrate (fatty acid potassium salts)	40°F	Yes	No	Yes	Yes	No	Yes	No	Keep away from open flame. Contact manufacturer if bottles rupture due to cold.
Cygon 400 (dimethoate)	45°F	Yes	Yes	No			Yes	Yes	Do not store below 45°F (label statement).
Diazinon 4E (diazinon)	None	No	Yes	Yes	Yes	No	No	No	None
Dibrom 8E (dibrom)	40°F	Yes	Yes	Yes	Yes	No	Yes	Yes	Keep from freezing.
Dimethoate 2.67EC (dimethoate)	32°F	Yes	Yes	No	N/A	N/A	Yes	Yes	Do not store in freezing conditions.
Dimethoate 4EC (dimethoate)	45°F	Yes	Yes	No	N/A	N/A	Yes	Yes	Store product above 45°F.
Di-Syston 8E (disulfoton)	-13°F	No	No	Yes	Yes	No	No	No	None
Dursban 4EC Reldan 4E (chlorpyrifos)	20°F	Yes	Yes	Yes	Yes	No	Yes	No	If crystals form, warm to 50° 70°F and agitate. Do not store above 100°F for extended periods.
Endosulfan 3EC (endosulfan)	0°F	Yes	Yes	Yes	Yes	No	Yes	No	None
Furadan 4F (carbofuran)	35°F	Yes	No	Yes	Yes	No	Yes	No	None
Guthion 2L (azinphos-methyl)	40°F	Yes	Yes	Yes	Yes	Yes	Yes	No	Warm to 60°F and shake well.
Guthion 2S (azinphos-methyl)	25°F	Yes	Yes	Yes	Yes	Yes	Yes	No	Warm to 60°F and shake well. Product efficacy is reduced if not completely re-homogenized.
Guthion 3F (azinphos-methyl)	25°F	Yes	No	Yes	Yes	No	No	No	Warm to 60°F and shake well.
Insectrin EC (permethrin)	32°F	Yes	Yes	Yes	Yes	No	Yes	No	None
Lannate L (methomyl)	32°F	Yes	Yes	Yes	Yes	No	Yes	Yes	None
Lorsban 4E (chlorpyrifos)	0°F	No	Yes	Yes	Yes	No	No	No	Warm to 50°F and shake well. Avoid heating above 122°F.
Malathion 57EC	0°F	No	Yes	Yes	Yes	No	Yes	No	Warm to 40°F and shake well.
Metasystox R 2SC (oxydemeton-methyl)-25°F	25°F	No	No	No	Yes	No	No	No	None
Methoxychlor 4L (methoxychlor)	32°F	Yes	Yes	Yes	Yes	No	Yes	No	Store above freezing temperatures.
Monitor 4 (methamidophos)	15°F	No	Yes	Yes	Yes	Yes	No	No	Product efficacy is satisfactory if completely re-homogenized after freezing. Protect from heat.
Parathion 8E (ethyl parathion)	0°F	No	Yes	Yes	Yes	No	Yes	No	Warm to 70°F and shake well.
Penncap 2FM (methyl parathion)	<32°F	No	No	Yes	No	No	No	No	None

Insecticides
Continued

Minimum storage temperature
Should freezing be avoided?
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Is agitation recommended if frozen?
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Are heated or insulated storage facilities recommended?
Should applicator contact manufacturer if product freezes?

Comments

Pyrellin EC (pyrethrins, rotenone)	40°F	Yes	Yes				Yes	Yes	None
SBP-1382 EC26% (resmethrin)	32°F	Yes		Yes	Yes	No	Yes	No	Warm to 70°F and shake well.
Seed Mate Lindane 25 EC-LF Seed Protectant (lindane)	40°F	Yes	Yes	Not well	Yes	Yes	Yes	Yes	Keep away from open flame.
Sevin 4-Oil (carbaryl)	None	No	Yes	Yes	Yes	No	No	No	Product will not freeze.
Sevin XLR Plus (carbaryl)	None	No	No			No	No	No	None
Sunspray 6E (petroleum distillate)	None								Product will not freeze.
Tame 2.4EC (fenpropathrin)	None	No	No	Yes	Yes	No	Yes	No	If product freezes, be sure it is mixed well before using.
Telone II, C-17 (chloropicrin)	None	No	No	N/A	No	No	No	No	None
Herbicides									
Avenge (diflufenzoquat)	32°F	Yes	Yes	Yes	Yes	No	Yes	No	None
Assure II (quizalofop)	32°F	Yes	Yes	Yes	Yes	No	Yes	Yes	Avoid freezing.
Betamix (desmedipham, phenmedipham)	40°F	Yes	Yes	Yes	Yes	No	Yes	No	Store above 40°F.
Betamix Progress (ethofumesate, desmedipham, phenmedipham)	40°F	Yes	Yes	Slow	Yes	No	Yes	No	Store above 40°F. Product efficacy is reduced if not re-dissolved, which is difficult.
Betanex (desmedipham)	40°F	Yes	Yes	Yes	Yes	No	Yes	No	Thaw product gradually.
Bladex (cyanazine)	None	Yes	No	Yes	Yes	No	No	No	None
Crossbow (2,4-D)	10°F	Yes	Yes	Yes	Yes	No	Yes	See next	If frozen agitate strongly for 15 minutes; if crystals reappear contact manufacturer.
Curtail (clopyralid + 2,4-D)	15°F	Yes	Yes	Yes	Yes	No	Yes	No	Agitate strongly for 15 mins; if crystals re-appear, contact manufacturer.
Cyclone (paraquat)	32°F	Yes	Yes	Yes	Yes	No	Yes	No	None
Far-Go 4EC (trallate)	32°F	Yes	Yes	Yes	Yes	No	Yes	No	If frozen warm to 72°F. Roll and shake container frequently over several days before using.
Garlon 3A,4 Redeem Remedy (triclopyr)	28°F	Yes	Yes	Yes	Yes	No	Yes	See next	Agitate strongly for 15 minutes; if crystals do not redissolve contact manufacturer.
Gramoxone Super (paraquat)	32°F	Yes	Yes	Yes	Yes	No	Yes	No	None
Hoelon 3EC (diclofop methyl)	20°F	Yes	Yes	Yes	Yes	No	Yes	No	Do not store below 20°F.
Hyvar-XL (bromacil)	32°F	Yes	No	Yes	Yes	No	Yes	No	None
Krenite S (fosamine ammonium)	32°F	No	Yes -24°	Yes	Yes	No	No	No	None

Herbicides Continued

	Minimum storage temperature	Should freezing be avoided?	Will product separate if frozen?	Will product redissolve after thawing?	Is agitation recommended if frozen?	Is product efficacy reduced?	Are heated or insulated storage facilities recommended?	Should applicator contact manufacturer if product freezes?	Comments
Lasso (alachlor)	32°F	Yes	Yes	Not well	Yes	No	Yes	No	Do not freeze! Product is difficult to redissolve after thawing.
Magnacide H (acrolcin)	-124°F	No	No	No	No	No	No	Yes	None
MCP Amine 4 (MCPA)	25°F	No	Yes	Yes	Yes	No	No	No	Warm to 70°F and shake well.
Nortron (ethofumesate)	40°F	Yes							
Rodco (glyphosate)	None								None
Roundup (glyphosate)	None	No	No	Yes	No	No	No	No	None
Stinger (clopyralid)	28°F	Yes	Yes	Yes	Yes	No	Yes	See next	Warm to 40°F and agitate. If crystals do not redissolve contact manufacturer.
Surflan (oxyzalin)	32°F	Yes	Yes	Yes	Yes	No	Yes	See next	Agitate strongly for 15 minutes. If crystals remain contact manufacturer.
Tordon 22K (picloram)	32°F	No	Yes	Yes	Yes	No	No	No	None
Treflan 5 EC (trifluralin)	40°F	Yes	Yes	Yes	Yes	No	Yes	See next	Strongly agitate for 15 minutes. If crystals do not redissolve, contact manufacturer.
Treflan MTF (trifluralin)	None	No	No	Yes	Yes	No	No	No	None
Velpar L (hexazinone)	32°F	Yes	Yes	Yes	Yes	No	Yes	No	Keep in heated storage.
2,4-D Amine 4	25°F	No	Yes	Yes	Yes	No	No	No	Warm to 70°F and shake well.
2,4-D Ester LV6	0°F	No	Yes	Yes	Yes	No	No	No	Warm to 45°F and shake well.

Fungicides

Champ F (copper hydroxide)	>32°	Yes	Yes	Yes	Yes	No	Yes	No	None
LT-2N E-Z Seed Protectant (PCNB)	40°F	Yes	Yes	Not well	Yes	Yes	Yes	Yes	Keep away from open flame.
Manzate 200 (mancozeb)	32°F	Yes	Yes	No	Yes	No	Yes	Yes	Product does not re-suspend well after freezing.
Mertect 340F (thiabendazole)	32°F	Yes	No	Yes	Yes	No	No	No	None
Propionic Acid (propionic acid)	None	No	No	No	No	No	No	No	Keep away from open flame.
Rubigan EC (fenarimol)	32°F	Yes	Yes	Yes	Yes	No	Yes	See next	If after strong agitation crystals do not redissolve, contact manufacturer.



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