

AGRICULTURAL

MU Guide

PUBLISHED BY MU EXTENSION, UNIVERSITY OF MISSOURI-COLUMBIA

muextension.missouri.edu/xplor/

Temperature Effects on Storage of Agricultural Pesticides

Fred Fishel
Department of Agronomy

The normal temperature range recommended for storing liquid pesticides is usually 40 to 100 degrees F. Some pesticide labels state the specific temperature range for maintaining optimal storage shelf life. Temperature extremes in the pesticide storage facility can potentially pose several problems.

Temperature extremes in storage can reduce the effectiveness of pesticides. Freezing of liquid pesticides can result in separation of the active ingredients from the solvents or emulsifiers, or inactivation of emulsifiers, which may lead to crystallization or coagulation of the pesticide. The freezing point of many pesticides is lower than 32 degrees F due to the hydrocarbon solvents or inert ingredients. Some pesticides may be thawed after being frozen, the container rolled, shaken or otherwise agitated to resuspend the contents. Call the manufacturer for advice on reusing specific pesticides if frozen. Excessive heat can cause some pesticides to volatilize and drift away from the storage site. Additionally, some pesticides are flammable.

Temperature extremes can also damage the integrity of the pesticide container. Freezing temperatures can cause glass, metal and plastic containers to break. High temperatures can cause plastic containers to melt and some glass containers to explode.

As a rule, wettable powders and granules are not affected by low temperatures. Moisture is the greatest

factor affecting their storage, as it can cause caking that may reduce the effectiveness of the pesticide. Products formulated in water-soluble packets have a high affinity for moisture and become brittle when frozen. If handled when brittle, bags may break open; these products should be stored in a warm, dry area.

Before storing pesticides, the applicator needs to read the "storage and disposal" section of the pesticide label. Many pesticide labels provide specific storage information. The following precautions should be used in the storage of all pesticides:

- Do not store near heat, sparks or open flame.
- Do not contaminate other pesticides, fertilizer, water, food or feed by storage.
- Keep containers tightly closed and dry in a cool, locked, well-ventilated place that is out of the reach of children.
- Store products in original containers only.
- If storage information cannot be found on the label, contact the manufacturer of the pesticide. The purpose of this guide is to provide specific storage information, including temperature requirements if relevant, for many of the commonly used agricultural pesticides. The following information was taken from the "storage and disposal" section of the respective pesticide labels.

Fungicides and seed protectants: Storage temperature guidelines.

Product	Comments
AS-50	Storage should be at a cool temperature with minimum exposure to the atmosphere.
Agri-mycin 17	Storage should be at a cool temperature with minimum exposure to the atmosphere.
Aliette/Maneb 2+2	If allowed to become wet the product will deteriorate and represent a fire hazard. Keep away from sources of ignition (e.g., sparks or open flame).
Benlate	Do not allow to become wet.
Benlate SP	Do not allow to become wet.

Product	Comments
Bravo (all products)	Protect from excessive heat.
Captan 50-WP	Protect from excessive heat.
Captec 4L	Protect from excessive heat. Protect from temperatures below 0F.
Dithane DF and M-45	Do not allow to become wet or overheated.
Dithane F-45 and ST	Do not store below 32F. Do not allow to become overheated.
Dithane WSP	Do not store below 32F. Do not allow to become wet or overheated.

Fungicides and seed protectants: Storage temperature guidelines. (continued)

Product	Comments
Enable	Do not store below 32F.
KickStart	Do not allow to freeze or become overheated.
Kumulus	Do not store above 104F.
Maneb 75DF and 80WP	Do not allow to become wet or overheated.
Manex II	Do not store below 32F.
Mertect LSP	Repeated freezing and thawing should be avoided.
Nova 40W	Water-soluble pouch may become brittle at storage temperatures below 32F; but the fungicide is not affected.
Nu-Cop 3L	Do not store below 32F.
Penncozeb 75DF and 80WP	Do not allow to become wet.

Product	Comments
Rubigan E.C.	Avoid freezing.
System3	Do not store in direct sunlight. Protect from extreme temperatures.
Terraclor Granular and WP formulations	Store in a dry location.
Terraclor Emulsifiable	Protect from temperatures below 20F.
Terranil S	Protect from excessive heat. Frozen product generally can be restored after thawing and thorough mixing.
Trilogy	Do not store below 40F.
Vitavax M DC	Protect from excessive heat.

Herbicides: Storage temperature guidelines.

Product	Comments
Accent Gold	Do not store above 122F for extended periods of time.
Accord	Store above 10F to keep product from crystallizing.
Alanap-L	Store between 60 and 80F. This product should not be stored below 60F, or it may crystallize or precipitate.
Amine 4 2,4-D	Do not store below 25F.
Aquathol K	Storage at temperatures below 32F may result in the product freezing or crystallizing.
Arsenal (all formulations)	Do not store below 10F.
Assert	Keep from freezing. Do not store below 40F.
Asulox	Store above 20F.
Balan DF	Do not store in direct sunlight. Do not store above 120F.
Balance WDG	Do not store under wet conditions.
Barrage HF	Do not store below 0F.
Basagran	Do not allow product to freeze.
Beacon	Do not store under wet conditions.
Blazer	Do not store below 32F.
Broadstrike + Treflan	Avoid freezing. Store above 40F.
Bronate	Store at temperatures above 3F.
Buctril (all formulations)	Store at temperatures above 3F.
Bullet	Store above -4F to keep product from freezing.
Chopper	Do not store below 10F.
Command 3ME	Store above -4F to keep product from freezing.
Command 4EC	Do not freeze. Do not store below 40F.
Conclude Ultra	Do not store below 32F or above 100F.
Conclude Xtra B	Keep from freezing. Do not store diluted spray. Store above 32F.
Conclude Xtra G	Keep from freezing. Store above 32F.
Contour	Keep from freezing. Do not store below 32F.
Crossbow	Store above 10F or agitate before use.
Curbit EC	Avoid freezing. Store above 40F.

Product	Comments
Curtail	Store above 40F or warm and agitate before use.
Curtail M	Store above 10F or warm and agitate before use.
Cyclone (both formulations)	Store at temperatures above 32F.
Ded-Weed SULV	Keep from freezing. Do not store near other herbicides, fertilizers, insecticides, fungicides, or near seeds.
Detail	Do not store below 32F. Keep from freezing.
Diquat	Store at temperatures above 32F.
DoublePlay	Can be stored at temperatures as low as -25F.
Dual: Magnum, II Magnum, and II Magnum SI	May be stored at temperatures down to -30F.
Eptam 7-E	Can be stored at temperatures as low as -50F.
Eradicane 25-G and 6.7-E	Can be stored at temperatures as low as -50F.
Exceed (Custom-Pak)	Do not store under wet conditions.
Facet 75 DF	Do not store under wet conditions. Handle carefully when stored at temperatures of less than 50F to avoid breaking bags.
Facet GR	Do not store under wet conditions.
Field Master	Do not store this product or spray solutions of this product in galvanized steel or unlined steel containers or spray tanks.
Flexstar	Store above 45F.
Freedom	Store above 32F to keep product in solution.
Frontier	Heated storage is required in bulk systems and recommended in mini-bulk systems and not required for 2 x 2.5 gallon package size.
Fultime	Can be stored at temperatures as low as -30F.
Galaxy	Keep from freezing. Store above 40F.
Goal 2XL	Keep from freezing. Store above 32F.
Gramoxone Extra	Store at temperatures above 32F.
Grandstand R	Store above 28F or agitate before use.
Hoelon 3EC	Do not store below 20F.

Herbicides: Storage temperature guidelines. (continued)

Product	Comments
Hornet	Do not store above 122F for extended periods of time.
Kerb 50-W	Store in a cool, dry place but not below 32F.
Laddok S-12	Do not store below 10F or above 100F.
Landmaster	Store above 40F to keep product in solution.
Lariat	Store above 40F.
Lasso 4EC	Store above 32F to keep product in solution.
Lasso II Granules	Below 32F this product can cake.
Liberty	Storage temperature should be 32–85F, with a maximum of 125F. Protect against direct sunlight.
Low Vol 4	Do not store below 0F.
Manifest (B and G formulations)	Keep from freezing. Store above 40F.
Micro-Tech	Store above -4F to keep product from freezing.
Moxy 2E	Store at temperatures above 3F. If allowed to freeze, remix before using.
NorthStar	Do not store under wet conditions.
Opti-Amine	Protect from freezing. If stored below 32F and crystals form, warm to 72F for 24 hours.
Option II	Do not store over 100F or below 10F.
Partner WDG	Do not subject to freezing. Product can be stored under either heated or unheated conditions.
Peak	Do not store under wet conditions.
Pentagon DG	Do not store above 125F.
Permit	Store under cool, dry conditions (below 120F). Do not store under moist conditions.
Poast and Poast Plus	Do not store below 32F or above 100F.
Prefar	Protect from temperatures below 42F. At temperatures below 42F, product may crystallize.
Princep Caliber 90	Store in a dry place.
Prowl 3.3EC	Do not store below 40F. Extended storage at temperatures below 40F can result in the formation of crystals on the bottom of the container.
Pursuit 2AS and W	Keep from freezing. Do not store below 32F.
Pursuit Plus	Keep from freezing. Do not store below 40F.
Ramrod Flowable	Store above 20F and below 100F to keep product in suspension.
Ranger	At temperatures below 50F, the viscosity of this product may increase to a point that pouring and mixing could be difficult.

Product	Comments
Raptor	Keep from freezing. Do not store below 32F.
Reflex	Store above 32F.
Remedy	Store above 28F or agitate before use.
Rezult (B and G formulations)	Do not allow this product to freeze.
Scepter O.T.	Keep from freezing. Do not store below 32F.
Scorpion III	Do not store above 122F for extended periods of time. Water soluble packets may become brittle when stored below 32F.
Shotgun	Do not store below 0F.
Sonalan HFP	Avoid freezing. Store above 40F.
Spirit	Do not store under wet conditions.
Squadron	Keep from freezing. Do not store below 40F.
Stalker	Do not store below 10F.
Stam 4E and M-4	Protect from freezing. If stored below 32F and crystals form, warm to 72F for 24 hours.
Starfire	Store at temperatures above 32F.
Status	Store above 32F.
Steel	Do not store below 40F.
Stinger	Store above 28F or warm to 40F and agitate before use.
Storm	Keep from freezing. Store above 32F.
Surpass 100	Can be stored at temperatures as low as -30F.
Surpass 20-G	Can be stored at temperatures as low as -50F.
TopNotch	Can be stored at temperatures as low as -30F.
Tordon 101 Mixture	If exposed to subfreezing temperatures, the product should be warmed to at least 40F and mixed thoroughly before using.
Tornado	Store above 32F. If product freezes, return to room temperature and agitate to reconstitute.
Treflan HFP	Avoid freezing. Store above 40F.
Treflan TR-10	May be stored in unheated warehouses.
Tri-4 HF	Avoid freezing. Store above 40F.
Tri-Scept	Keep from freezing. Do not store below 40F.
Trifluralin (480, 4EC and HF formulations)	Avoid freezing. Store above 40F.
Trilin	Avoid freezing. Store above 40F.
Typhoon	Store above 32F. If product freezes, return to room temperature and agitate to reconstitute.
Velpar L	Do not subject to temperatures below 32F.
Whip 360	Do not store over 100F or below 10F.

Insecticides/Miticides/Nematicides: Storage temperature guidelines.

Product	Comments
Agree WG	Store at temperatures below 104F.
Ambush 2EC	Protect from freezing.
Ambush (wetable powder and water soluble pack)	Do not store diluted material.
Ammo 2.5EC	Do not store below 10F.
Ammo WSB	Do not store at temperatures below 32F. Allow to warm above 50F before use.

Product	Comments
Biobit XL	Store in temperatures above 32F and below 90F.
Capture 2EC	Do not freeze. Do not store below 40F. If crystals are observed, warm material to above 60F by placing container in warm location.
Chlorpyrifos 4E AG	Do not store above 100F for extended periods. Storage below 20F may result in formation of crystals. If product crystallizes, store at 50 to 70F and agitate to redissolve crystals.

Insecticides/Miticides/Nematicides: Storage temperature guidelines. (continued)

Product	Comments
D-Z-N AG600 WBC	If freezing occurs, place the product in a warm room (68F or above) and allow to thaw.
Decis 1.5EC	Do not store over 100F or below 50F.
Declare	Do not store below 0F.
Design	Store at temperatures below 104F.
Dicofol 4E	Keep from freezing. Store at 32 to 110F.
Dimethoate 400	Do not store below temperatures of 45F.
Dimethoate 4EC	Do not store below 32F as it may tend to crystallize. Avoid storage above 90F, as prolonged storage above 90F may cause some loss in grade.
Dimethoate 5 LB.	This product is susceptible to moisture. Do not store below 40F as product may crystallize. Avoid storage above 95F as prolonged storage above 90F may cause loss in grade.
Dimilin 25W and 2L	Store in a dry location.
DiPel (ES and ES CPI)	Do not store at temperatures greater than 100F.
Furadan 4F	Furadan 4F is freeze/thaw stable. If frozen, thaw and agitate before reuse. To keep the product from freezing, store above 32F.
Fury 1.5EC	Do not store below 20F. If solids are observed, warm to above 40F.
Gemstar LC	Store at temperatures below 90F. Storing the product in a freezer or refrigerator will extend its shelf life.
Gnatrol	Store between 59 and 86F.
Golden Leaf Tobacco Spray	Do not store below 20F.
Guthion 2L	Do not store below 45F.
Guthion Solupak 50% WP	Do not store below 32F.
Javelin WG	Protect from freezing. Storage at temperatures above 90F may impair effectiveness.
Karate Z	Do not allow product to freeze.
Kelthane 50 WSP	The water-soluble pouch may become brittle at storage temperatures below 32F but the miticide is not affected.
Kelthane MF	Keep from freezing. Store at 32 to 110F.
KickStart	Do not allow to freeze or become overheated.
Lannate LV	Do not subject to temperatures below 32F.
Lannate SP	Allow to warm above 50F for normal handling.
Larvin 3.2	Do not allow prolonged storage in areas where temperatures frequently exceed 115F.

Product	Comments
Lorsban 4E	Do not store above 100F for extended periods. Storage below 20F may result in formation of crystals. If product crystallizes, store at 50 to 70F and agitate to redissolve crystals.
Lorsban 50-W	Bags may become brittle when stored below 32F. Do not store above 100F for extended periods of time.
Malathion 57 EC	Do not store below 0F. If frozen, warm to 40F and redissolve.
Mustang 1.5 EW	Do not freeze.
Neemix 0.25 and 4.5	Do not store below 50F or above 95F.
Nemacur 3	Do not store below 32F.
Novodor	Storage at temperatures between 40 and 50F is recommended for maximum product stability. Storage at temperatures above 90F for an extended period of time should be avoided.
Phaser 3EC	Do not store below 20F.
Pounce 3.2 EC	Do not store below 10F.
Pounce WSB	Do not store at temperatures below 32F. Allow to warm above 50F before use.
Provado Solupak	Do not store below 32F.
Scout X-TRA	Do not store over 100F or below 10F
Scout X-TRA Gel	Do not store this product under wet conditions.
Sevin (all formulations)	Do not store in areas where temperatures frequently exceed 100F.
Sniper 50 PVA	Store below 120F. Do not store next to herbicides.
Spod-X LC	Store at temperatures below 90F. Storing the product in a freezer or refrigerator will extend its shelf-life.
Temik (all formulations)	Do not store in areas where temperature averages 115F or greater.
Thiodan 3 EC	Do not store below 20F.
Thiodan Cottonseed Oil	Do not store below 0F.
Thirethrin	Do not store below 20F.
Thuricide	Activity may be impaired by storage at temperatures above 90F.
Trigard	Do not store this product under wet conditions.
Trilogy	Do not store below 40F.
VectoBac 12AS	Store between 59 and 86F.
Vydate C-LV and L	Do not subject to temperatures below 32F.

