



Storage Limitation Statements: Temperature--Fungicides¹

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This guide provides general temperature effects on storage properties of agricultural fungicides. A table is included which lists many of the common agricultural fungicides registered for use in Florida with storage statement limitations listed.

Introduction

The effectiveness and usability of many pesticides is influenced by the temperature at which they are held in storage. The labels of most liquid pesticides that contain specific information on adequate storage temperatures will generally state a temperature in the 40 to 100° F range. For most of Florida, freezing is not a normal concern with pesticide storage, but extreme heat is a factor for the entire state.

Freezing temperatures can render a liquid-formulated pesticide useless by causing the active ingredients to separate from its solvents, emulsifiers, and other inert ingredients. The result may be either crystallization or coagulation of the formulation. Some products may be thawed and reused after adequate agitation – their labels will

specifically state if this is the case. Because of the ingredients in the formulation, the freezing point of many products may be lower than 32° F.

Heat is the major concern in Florida regarding pesticide storage problems. Heat can cause some pesticides to volatilize and drift from their containers, especially if containers are not adequately sealed. Flammability is a problem with some pesticides associated with heat and/or open flame. It is discussed in more detail in UF/IFAS EDIS Extension Document PI-97, *Pesticide Labeling: Physical or Chemical Hazards* (<http://edis.ifas.ufl.edu/PI134>).

Containers may be damaged by either temperature extreme. The integrity of the container may be destroyed by freezing temperatures that cause glass, metal, and plastic materials to break. Alternatively, high temperatures can cause plastic containers to melt and glass to explode. The liquid pesticide contents in metal drums can cause expansion and eventual rupturing (Figure 1).

Generally, dry pesticide formulations are not adversely affected by temperature extremes. Their

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Figure 1. Pesticide drum bulging from extreme heat.

effectiveness is most often reduced by the presence of moisture in storage. These products have a high affinity for water and once absorbed, may solidify into hard masses, like tombstone formation. The packaging that surrounds dry products formulated as water-soluble packets can become brittle after taking on moisture; and if freezing occurs, they can break when handled.

To learn of storage temperature limitations for individual products, consult the “Storage and Disposal” section of the pesticide's label (Figure 2). Many products will have specific temperature limitations mentioned in this section; others may be more general. If you have questions regarding these limitations, consult the products manufacturer.

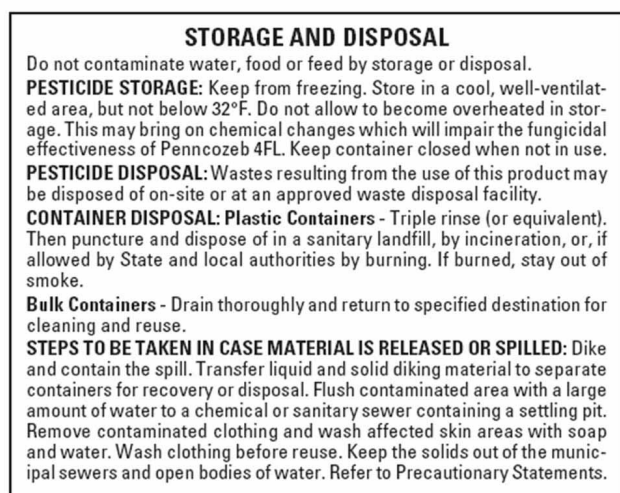


Figure 2. The Storage and Disposal section of the label often contains specific temperature information.

General information on storage and disposal language that is found on pesticide labels is discussed in UF/IFAS EDIS Extension Document PI-106,

Pesticide Labeling: Storage and Disposal (<http://edis.ifas.ufl.edu/PI143>).

The following table provides a listing of many commonly-used agricultural fungicides registered for use in Florida. They are listed alphabetically by active ingredient common name with their trade names and any storage limitation statements that may be listed in their Storage and Disposal directions.

Additional Information

Fishel, F.M. 2006. Pesticide Labeling: Physical or Chemical Hazards. UF/IFAS EDIS Extension Document PI-97. <http://edis.ifas.ufl.edu/PI134>.

Fishel, F.M. 2006. Pesticide Labeling: Storage and Disposal. UF/IFAS EDIS Extension Document PI-106. <http://edis.ifas.ufl.edu/PI143>.

Table 1. Storage precaution statements for commonly used agricultural fungicides.

Trade name*	Common name	Label statements
Captan 400 [®] Captan 4L [®] Captan 50WP [®] Captan 80WP [®] Captan 80WDG [®] Captan 4000 [®]	Captan	Store in a cool, dry location. Do not store in direct hot sunlight. After prolonged storage in intense cold, allow product to return to 25° F before using. Storage should be in a cool, dry area away from any heat or ignition source. Avoid storage at high temperatures. Protect from excessive heat. Store in a cool, dry place. Store in a cool, dry place.
Bravo Ultrex [®] Daconil Ultrex [®] Daconil Weather Stik [®] Bravo Weather Stik [®] Bravo Zn [®] Daconil Zn [®]	Chlorothalonil	Store in a dry place. Store in a cool place. Protect from excessive heat.
Botran [®]	Dicloran	Store in a cool, dry place.
Dodine 65W [®] Elast 400 [®] Syllit FL [®]	Dodine	Storage should be in a cool, dry area away from any heat or ignition source. Do not allow storage in a damp or humid area. Do not use or store near heat, open flame or hot surfaces.
Enable [®]	Fenbuconazole	Store in a cool dry well-ventilated area, but not below 32° F.
Ferbam Granuflo [®]	Ferbam	Keep away from fire and sparks. Store in a cool, dry place and avoid excess heat.
Dithane 75DF [®] and M45 [®] Fore 80WP [®] Dithane F-45 [®] Penncozeb 4FL [®] Penncozeb 75DF [®] and 80WP [®]	Mancozeb	Keep away from fire and sparks. Store in a cool, dry well-ventilated area. Do not allow stored product to become wet or overheated in storage; decomposition, impaired activity, or fire may result. Keep from freezing. Store in a cool, well-ventilated area, but not below 32° F. Do not allow to become overheated in storage. This may bring on chemical changes that will impair the fungicidal effectiveness. If allowed to become wet the product will deteriorate and represent a fire hazard. Keep away from sources of ignition (e.g. sparks and open flame).
Penncozeb [®]	Mancozeb	Keep from freezing. Store in a cool, well-ventilated area, but not below 32° F. Do not allow to become overheated in storage.
Manex [®]	Banner GL [®]	Store in a cool, dry place.

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Trade name*	Common name	Label statements
Ridomil Gold GR [®]	Mefenoxam	Store in a dry place.
Ridomil Gold/Copper [®]		Store in a cool, dry place. Do not store this product under wet conditons.
Metam CLR 42% [®] Metam KLR 54% [®] Metam Sodium [®]	Metam-sodium	Do not store below 0° F. Product crystallizes at lower temperatures. If exposed, warm or store at higher temperatures and mix to redissolve crystals and assure uniformity before use.
Vapam HL [®]		Do not store below 32° F. Product crystallizes at lower temperatures. Warm or store at higher temperatures and mix to redissolve crystals and assure uniformity before use.
Polyram [®]	Metiram	Store in a cool, dry place and avoid excess heat.
Eagle 20EW [®] Eagle 40WP [®] Nova 40W [®] Systhane WSP [®]	Mycobutanil	Store in a cool, dry area above freezing.
		Store in a cool, dry area above freezing. The water-soluble pouch may become brittle at storage temperatures below 32° F, but the fungicide is not affected.
Terraclor 15G [®] Terraclor 75WP [®] Terraclor 2E [®]	Pentachloronitrobenzene	Store in a dry location.
		Protect from temperatures below 20° F.
Banner GL [®] EchoPropiMax [®] Tilt [®] Tilt/Bravo [®]	Propiconazole	Store in a cool, dry place. Do not store below 40° F. Do not store this product under wet conditions. Store in a cool place. Protect from excessive heat.
		Store in cool place. Store in a cool place. Protect from excessive heat. Keep from freezing.
Elite DF [®] Elite WP [®] Folicur 3.6F [®]	Tebuconazole	Store in a cool, dry place.
		Store in a cool, dry place. Do not store below freezing. Exposure to moisture or excessive handling of water soluble packets may cause breakage. Store in a cool, dry place.
Mertect 340-F [®]	Thiabendazole	Store in a cool, dry place. Do not store below 32° F.

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Trade name*	Common name	Label statements
Thiram 42-S [®] Thiram 50WP [®] Raxil [®] Thiram Granuflo [®] Thiram 65WSB [®]	Thiram	Do not subject to temperatures below 32° F. Store in a cool, dry place. Protect from excessive heat.
Bayleton 50WSP [®] Bayleton 50WDG [®] Bayleton 50DF [®] Strike 50WDG [®]	Triadimefon	Store in a cool, dry place. Do not store below freezing (32° F). Store in a cool, dry place.
Compass [®] Flint [®] Gem [®]	Trifloxystrobin	Store in a cool, dry place.
Charter [®]	Triticonazole	Protect from frost and freezing.
Ziram 76DF [®] Ziram Granuflo [®]	Ziram	Keep away from sources of ignition (e.g. sparks and open flame). Keep away from fire and sparks. Store in a cool, dry place and avoid excess heat.