

UNIVERSAL Crop Protection (Pty) Ltd
Co. Reg. No.: 83/08184/07

Subject: TERBUFOS GR
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Product Code: ITER02P/U

UNIVERSAL TERBUFOS GR

MATERIAL SAFETY DATA SHEET

1. IDENTIFICATION OF THE SUBSTANCE

Product name: TERBUFOS GR
UN No.: 2783
Supplier: Universal Crop Protection (Pty) Ltd.
PO Box 801
Kempton Park, 1620, South Africa
Telephone: (011) 396 2233
Fax: (011) 396 4666
Website: www.villacrop.co.za

Emergency telephone: (011) 396 2233
083 326 9272

24 Hr Emergency Numbers:
Bateleur Trauma: 0860 333 911
(Client: Villa Crop Protection)
Red Cross Poison Information Centre: 021 689 5227
Tygerberg Poison Information Centre: 021 931 6127
Griffon Poison Information Centre: 082 446 8946

2. COMPOSITION / INFORMATION ON INGREDIENTS

Common Name: Terbufos
Chemical Name: *S-tert-butylthiomethyl O,O-diethyl phosphorodithioate (IUPAC)*
CAS N^o: 13071-79-9
Chemical Family: Organophosphorus
Chemical Formula: C₉H₂₁O₂PS₃ (Mol. wt.: 288.4)
Use: Systemic, soil-insecticide and nematicide with stomach and contact action.
Formulation: Terbufos: 100 g/kg Granules.
Hazardous Component: Terbufos
SYMBOLS: T+
RISK-PHRASE(S): R 26/27/28

3. HAZARD IDENTIFICATION

Toxicity class: WHO Ia; EPA I
Terbufos products are labelled with a TOXIC signal word, and are extremely toxic by ingestion, skin absorption and inhalation.
Target effect: cholinesterase inhibition.
At increased risk from exposure: persons with respiratory ailments, recent exposure to cholinesterase inhibitors or impaired cholinesterase production, or liver malfunction.
Likely routes of exposure: Eye contact, skin contact, ingestion, and inhalation

Eye contact:

Product is absorbed through ocular exposure producing systemic effects.

Skin contact:

Highly toxic by skin application. Repeated exposure may inhibit cholinesterase activity.

Ingestion:

Extremely toxic if ingested. See point 4 for symptoms.

Inhalation:

Extremely toxic by inhalation. Airborne Terbufos can be absorbed through lungs to produce cholinesterase inhibition. See point 4 for symptoms.

4. FIRST AID MEASURES AND PRECAUTIONS

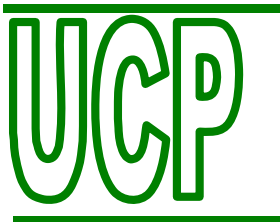
Proper care should be taken during occupational use to avoid any inhalation of spray particles, and to prevent accidental contamination of food products and water.

Inhalation:

Organophosphates: Cholinesterase inhibitor

Acute exposure:

When inhaled, the first effects of cholinesterase inhibitors are usually respiratory and may include nasal hyperemia and watery discharge, cough, chest discomfort, dyspnea, and wheezing due to increased bronchial secretions and bronchoconstriction. If sufficient amounts are absorbed, other systemic effects may begin within a few minutes or be delayed for up to 12 hours. Symptoms may include pallor, nausea, vomiting, diarrhoea, abdominal cramps, headache, dizziness, ocular pain, blurred vision, miosis or in some cases, especially initially, mydriasis, lacrimation, salivation, sweating, and confusion. Other reported central nervous system or neuromuscular effects may include ataxia, slurred speech, areflexia, weakness, fatigue, fasciculations, twitching, tremors possibly of the tongue and eyelids, and eventually paralysis of the extremities and possibly of the respiratory muscles. In severe cases there may also be involuntary defecation and urination, cyanosis, psychosis, hyperglycemia, acute pancreatitis, cardiac irregularities, pulmonary edema, unconsciousness, convulsions, and coma. Death is primarily due to respiratory failure, although cardiovascular effects including cardiac arrest may also be implicated. Long term sequelae are rare but may include neuropsychiatric disorders and myopathy with muscle tenderness. Some organophosphates may cause a delayed neuropathy beginning 1-4 weeks after an acute exposure which may or may not have caused acute cholinergic effects. Numbness, tingling, weakness and cramping beginning symmetrically in the lower limbs may progress to ataxia and paralysis. In severe cases, upper



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limb involvement is possible and flaccid paralysis may progress to spastic paralysis with exaggerated reflexes. Improvement may occur over months to years, but some residual impairment usually remains.

Chronic exposure:

Repeated or prolonged exposure may result in the effects of acute exposure including the delayed neuropathy. Other effects reported in workers repeatedly exposed include impaired memory and concentration, acute psychosis, severe depressions, irritability, confusion, apathy, emotional lability, social withdrawal, confusion, headache, speech difficulties, delayed reaction times, spatial disorientation, nightmares, sleepwalking, and drowsiness or insomnia. An influenza-like condition with headache, nausea, weakness, anorexia and malaise has also been reported.

First aid:

Remove from exposure to fresh air immediately. If breathing has stopped, give artificial respiration (not direct mouth to mouth). Maintain airway and blood pressure and administer oxygen if available. Keep affected person warm and at rest. Treat symptomatically and supportively. Administration of oxygen should be performed by qualified personnel. Get medical attention immediately.

Skin contact:

Organophosphates: Cholinesterase inhibitor

Acute exposure:

Localized sweating and fasciculation's may occur at the site of contact. If sufficient amounts are absorbed, other effects of cholinesterase inhibition as described in acute inhalation occur. Symptoms may be delayed 2 to 3 hours, but usually no more than 12 hours. The rate of absorption is increased by the presence of dermatitis or high ambient temperatures. Delayed neuropathy is also possible.

Chronic exposure:

Repeated or prolonged exposure may cause effects as described in acute exposure. Some organophosphates may cause sensitisation.

First aid:

Remove contaminated clothing immediately. Wash contaminated areas with soap and water followed by alcohol. Emergency personnel should wear gloves and avoid contamination. Treat respiratory difficulty with artificial respiration. Get medical attention immediately.

Eye contact:

Organophosphates: Cholinesterase inhibitor

Acute exposure:

Direct contact may cause pain, hyperemia, lacrimation, twitching of the eyelids, miosis, and ciliary muscle spasm with loss of accommodation, blurred or dimmed vision and browache. Sometimes mydriasis may occur instead of miosis. With sufficient exposure, other symptoms of

cholinesterase inhibition as described in acute inhalation may occur.

Chronic exposure:

Repeated or prolonged exposure may cause effects as described in acute exposure.

First aid:

Irrigate eyes with water or saline solution. If symptoms of poisoning occur, treat respiratory difficulty with artificial respiration and oxygen. Observe patient for at least 24 to 36 hours. Get medical attention immediately. Oxygen should be administered by qualified medical personnel.

Ingestion:

Organophosphates: Cholinesterase inhibitor

Acute exposure:

When ingested, the first effects may be nausea, vomiting, anorexia, abdominal cramps and diarrhoea. Gastrointestinal absorption may cause symptoms of cholinesterase inhibition as described in acute inhalation. Symptoms may begin within minutes or be delayed for hours. Delayed effects including neuropathy may also occur.

Chronic exposure:

Repeated ingestion may cause effects as described in acute exposure.

First aid:

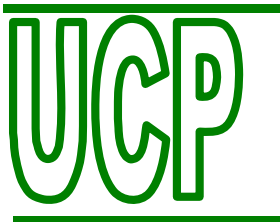
If person is alert and respiration is not depressed, give syrup of IPECAC followed by water (if vomiting occurs, keep head below hips to prevent aspiration). If consciousness level declines or vomiting has not occurred in 15 minutes empty stomach by gastric lavage with the aid of cuffed endotracheal tube using isotonic saline or 5% sodium bicarbonate followed with activated charcoal. Establish and maintain airway. Treat respiratory difficulty with artificial respiration and oxygen.

Do not give morphine, aminophylline, phenothiazines, reserpine, furosemide, or ethacrynic acid. Treat symptomatically and supportively. Administration of oxygen and lavage must be performed by qualified medical personnel. Get medical attention immediately.

Advice to the physician:

Antidote:

The decision as to whether the severity of poisoning requires administration of any antidote and actual dose required should be made by qualified medical personnel. For cholinesterase inhibitors: Establish clear airway and tissue oxygenation by aspiration of secretions, and if necessary, by assisted pulmonary ventilation with oxygen. Improve tissue oxygenation as much as possible before administering Atropine to minimise the risk of ventricular fibrillation. Administer Atropine Sulphate intravenously, or intramuscularly if *iv* injection is not possible. In moderately severe poisoning administer Atropine Sulphate; 0.4 to 2.0



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mg repeated every 15 minutes until atropinization is achieved (tachycardia, flushing, dry mouth, mydriasis). Maintain atropinization by repeated doses for 2 to 12 hours, or longer, depending on the severity of poisoning. The appearance of rales in the lung bases, miosis, salivation, nausea, bradycardia, are all indications of inadequate atropinization. Severely poisoned individuals exhibit remarkable tolerance to Atropine; two or more times the dosages suggested above may be needed. Persons not poisoned or only slightly poisoned, however, may develop signs of atropine toxicity from such large dosages: fever, muscle fibrillations, and delirium are the main signs of atropine toxicity. If these signs appear while the patient is fully atropinized, atropine administration should be discontinued, at least temporarily. Observe treated patient closely at least 24 hours to insure that symptoms (possibly pulmonary edema) do not recur as atropinization wears off. In very severe poisonings, metabolic disposition of toxicant may require several hours or days during which atropinization must be maintained. Markedly lower levels of urinary metabolites indicate that atropine dosage can be tapered off. As dosage is reduced, check the lung bases frequently for rales. If rales are heard or other symptoms return, re-establish atropinization promptly. Administration of antidote must be performed by qualified medical personnel. In cases of severe poisoning by organophosphate pesticides in which respiratory depression, muscle weakness and twitchings are severe, give **Pralidoxime (Protopam-ayerst, 2-PAM)**, 1.0 gram intravenously at no more than 0.5 gram per minute. Dosage of pralidoxime may be repeated in 1 to 2 hours, then at 10 to 12 hours intervals if needed. In very severe poisonings, dosage rates may be doubled. Treatment with pralidoxime will be most effective if given within thirty-six hours after poisoning. Antidote should be administered by qualified medical personnel.

5. FIRE FIGHTING MEASURES

Fire and explosion hazard:

The material does not burn or burns with difficulty. Dust-air mixtures are explosive.

Extinguishing media:

Carbon dioxide, dry chemical powders, foam and water.

Fire fighting:

Keep unnecessary people away. Use as little water as possible. Dike area of fire to prevent pesticide run-off. Use spray or fog – solid stream may cause spreading. Conduct fire fighting and rescue operations from upwind of the fire area. Evacuate people downwind who may come in contact with smoke, fumes, or contaminated surfaces.

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Do not decontaminate personnel or equipment, or handle broken packages or containers without protective equipment as specified in section 8. Decontaminate emergency personnel with soap and water before leaving the fire area. Avoid breathing dusts, vapours and fumes from burning materials. Alert medical personnel to be ready to treat for pesticide poisoning. Control run-off water - if water enters a drainage system, advise the authorities downstream.

Personal protective equipment:

Fire fighters and others that may be exposed should wear full protective clothing and self-contained, positive pressure breathing apparatus.

6. ACCIDENTAL RELEASE MEASURES (SPILLAGE)

Occupational spill:

Shovel spilled material into covered containers for proper disposal, or reuse if possible. Decontaminate spill area and tools several times with a solution of 85% water, 10% bleach, and 5% isopropyl alcohol.

Contain and absorb decontamination solution with inert absorbents (e.g. granular clay), and place into the same disposal container as spilled material. Depending on the quantity released to the environment, notifications to regulatory authorities may be required. If spill is to a water body, immediately notify applicable authorities downstream, so that contingencies can be taken, if necessary.

Personal precautions:

Chemical protective clothing usage is advised, i.e. wear neoprene gloves, cotton overalls and safety goggles.

7. HANDLING AND STORAGE REQUIREMENTS

Handling:

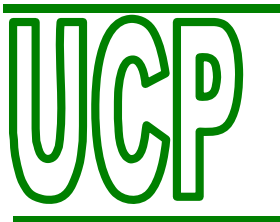
Handle all crop protection chemicals with care and caution. Do not eat, drink, smoke or go to the toilet with pesticide-contaminated hands. Always wash hands thoroughly after handling pesticides or waste.

Storage:

Do not store near sources of sparks, flame or heat. Store in a dry, cool, well-ventilated warehouse in well-labelled containers. Not to be stored next to foodstuffs and water supplies. Keep away from children and animals. Local regulations should be complied with.

8. EXPOSURE CONTROL / PERSONAL PROTECTION

It is essential to provide adequate ventilation. The measures appropriate for a particular work site depend on how this material is used and on the extent of exposure.



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Ensure that control systems are properly designed and maintained. Comply with occupational safety, environmental, fire, and other applicable regulations.

Personal protective equipment:

If engineering controls and work practices are not effective in controlling exposure to this material, then wear suitable personal protective equipment including approved respiratory protection.

Respirator:

An approved respirator suitable for protection from dusts and mists of pesticides is adequate. Limitations of respirator use specified by the approving agency and the manufacturer must be observed.

Clothing:

Employee must wear appropriate protective (impervious) clothing and equipment to prevent repeated or prolonged skin contact with this substance.

Gloves:

Employee must wear appropriate synthetic protective gloves to prevent contact with this substance.

Eye protection:

The use of safety goggles is recommended.

Emergency eye wash: Where there is any possibility that an employee's eyes may be exposed to this substance; the employer should provide an eye wash fountain or appropriate alternative within the immediate work area for emergency use.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:

Brown to grey granule.

Odour:

Mercaptan-like odour

Flammability:

Not flammable.

Explosive properties:

Not explosive.

Flash point:

Not applicable.

Oxidising properties:

No oxidising properties.

pH:

Not applicable

Bulk density:

1.0 g/ml

Vapour pressure:

3.2×10^{-4} mm Hg @ 25 degree Celsius (a.i.)

Stability:

Stable for more than 2 years at room temperature. Decomposes on prolonged heating above 120 °C. Hydrolysed by strong alkalis (pH >9) and acids (pH <2).

Boiling point:

Not applicable.

Melting point:

Not applicable.

10. STABILITY AND REACTIVITY

Storage stability:

Product is stable for a minimum of 2 years under normal storage conditions. Avoid heat, strong oxidisers and strongly alkaline materials.

Hazardous decomposition products:

Thermal decomposition may produce hydrogen sulphide, mercaptans, and oxides of carbon, phosphorus, and sulphur.

11. TOXICOLOGICAL INFORMATION

Acute oral LD₅₀:

The oral LD₅₀ for rats is 13 mg/kg

Acute dermal LD₅₀:

The dermal LD₅₀ for rabbits is 10 mg/kg

Acute inhalation LC₅₀:

The inhalation LD₅₀ (4 h) for male rats is 0.0061 mg a.i./l air and for females is 0.0012 mg/l air.

Acute skin irritation:

The product causes skin irritation.

Acute eye irritation:

The product causes eye irritation. It may be absorbed through the conjunctiva to produce cholinesterase inhibition.

Dermal sensitisation:

The product causes skin sensitisation.

Carcinogenicity:

Studies did not detect carcinogenic activity. No human information available.

Teratogenicity:

Studies did not detect any teratogenic effects. No human information available.

Mutagenicity:

Studies did not detect any mutagenic effects. No human information available.

12. ECOLOGICAL INFORMATION

FATE AND BEHAVIOUR IN SOIL:

Rate of degradation:

Oxidative and hydrolytic degradation occurs in soil with the half-life of 9 to 27 days.

Mobility:



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Terbufos is generally immobile and is therefore unlikely to leach or contaminate groundwater. Much of chemical can be recovered near the site of application.

Accumulation:

The product does not accumulate.

FATE AND BEHAVIOUR IN WATER:

Rate and route of degradation:

Terbufos hydrolyses rapidly. At a concentration of 4.6 ppm, its hydrolysis half-lives were 4.5, 5.5 and 8.5 days at pH 5, 7 and 9 respectively. Formaldehyde was the major degraded detected.

FATE AND BEHAVIOUR IN VEGETATION:

Terbufos moves from the soil into plants, where it is broken down rapidly. Little of the parent compound is found in plants. Fifty-seven days after seeding and application, the total residues in broccoli were very low, while the marketable heads of broccoli harvested 90 days after seeding held only traces (less than 0.01 ppm, fresh weight) of residues.

ECOTOXICOLOGY:

Birds:

Extremely toxic to birds.

Bobwhite quail: LC₅₀ is 28.6 mg/kg.

Bobwhites: Dietary LC₅₀ is 143 to 157 ppm.

Fish:

Extremely toxic to fish.

Freshwater fish species: LD₅₀ is 0.77 to 20 ppb

Daphnia magna:

LC₅₀ is 0.31 ppb.

Bees:

Not toxic to bees when used as directed.

Earthworms:

No data available.

Other non-target species:

Extremely toxic to mammals, reptiles and wildlife.

13. DISPOSAL CONSIDERATION

Pesticide disposal:

To avoid disposal, end users should attempt to utilise the product completely according to label instructions. If this is not possible, handle with care, and dispose in a safe manner. This product contains **Terbufos**, and can be toxic. It is the ultimate responsibility of the product user to determine at the time of the disposal whether the product (and/or 'empty' container residue) meets any other hazardous waste criteria. Follow all applicable state and local regulations regarding waste management methods. The recommended disposal method for this product is incineration.

Package product wastes:

Empty containers may retain some product residues. DO NOT RE-USE. Triple rinse, render container unusable by crushing and/or puncturing, and dispose in a safe manner. Follow all applicable state and local regulations regarding waste management methods.

14. TRANSPORT INFORMATION

UN NUMBER: 2783

ADR/IRD:

Substance ID no.: 2783

Hazard ID no.: 66

Label: 6.1

IMDG/IMO:

Packaging group: II

Label of class: 6.1 **Marine pollutant**

Shipping name: Organo Phosphorus Pesticides, Solid, Toxic, N.O.S. (**Terbufos**)

AIR/IATA:

Class: 6.1

Hazard Label: Toxic

Packaging Group: II

Passenger Aircraft: 613 Y613

Cargo Aircraft: 615

15. REGULATORY INFORMATION

Symbol: T+

Risk phrases:

R 26//27/28 Very toxic by inhalation, in contact with skin and if swallowed.

R 50 Very toxic to aquatic organisms.

Safety phrases:

S 1/2 Keep locked up and out of reach children.

S 22 Do not breathe dust.

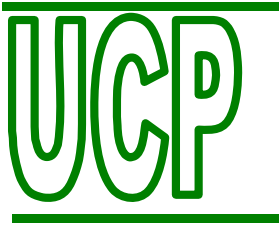
S 36/37/39 Wear suitable protective clothing, gloves and eye/face protection.

S 45 In the case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

Indication of danger: Very toxic

16. PACKING AND LABELLING

Packed in 15 kg, 20 kg and 25 kg aluminium foil lined and plastic bag containers within 3 ply paper box and labelled according to South African regulations and guidelines.



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17. OTHER INFORMATION

All information and instructions provided in this Material Safety Data Sheet (MSDS) are based on the current state of scientific and technical knowledge at the date indicated on the present MSDS and are presented in good faith and believed to be correct. This information applies to the PRODUCT AS SUCH. In case of new formulations or mixes, it is necessary to ascertain that a new danger will not appear.

It is the responsibility of persons in receipt of this MSDS to ensure that the information contained herein is properly read and understood by all people who may use, handle, dispose or in any way come in contact with the product. If the recipient subsequently produces formulations(s) containing this product, it is the recipient's sole responsibility to ensure the transfers of all relevant information from this MSDS to their own MSDS.

18. REFERENCES

- *The Pesticide Manual*; Tenth Edition; Editor Clive Tomlin; Crop Protection Publications, 1994.
- *Pestline*; Material Safety Data Sheets for Pesticides and Related Chemicals; Volume II; Occupational Health Services Inc., 1991.
- EXTOXNET; Extension Toxicology Network

END OF DOCUMENT

Compiled: August 1998
Reviewed: February 2009