Orbit GR

SAFETY DATA SHEET

1. PRODUCT & COMPANY IDENTIFICATION

Product Name: Orbit GR

Pesticide Classification: Herbicide

UN No.: 3077

Supplier	**Registration Holder**
Enviro Bio-Chem (Pty) Ltd	Enviro Industries (Pty) Ltd t/a Enviro Weed Control Systems
Co. Reg. No.: 2013/194774/07	Co. Reg. No.: 1999/006136/07
44 Kerk Street, Lichtenburg	44 Kerk Street, Lichtenburg
North West, South Africa 2740	North West, South Africa 2740

Telephone: +27 87 231 7261

Fax: 086 541 7948

Website: www.envirobiochem.co.za

24 Hr Emergency Number: Bateleur: +27 83 123 3911

In case of Poisoning:

Poison Information Centre: +27 82 446 8946

Tygerberg Hospital: (+27 21) 931 6129

Poison Emergency Enquiries: (+27 21) 689 5227

Common Name: Bromacil 80 g/kg + Terbuthylazine 120 g/kg + Related Triazines 0.24 g/kg GR

Chemical Name: Bromacil: 5-Bromo-3-Sec-Butyl-6-Methyluracil (IUPAC)

Terbuthylazine: N^2-tert-butyl-6-chloro-N^4-ethyl-1,3,5-triazine-2,4-diamine (IUPAC)

Chemical Formula: Bromacil: $C_9H_{13}BrN_2O_2$

Terbuthylazine: $C_9H_{16}C\ell N_5$

CAS No.: Bromacil: 314-40-9 & Terbuthylazine: 5915-41-3

RSA Reg. No.: L6407 Act/Wet No. 36 of/van 1947

Botswana Reg. No.: W130684

2. COMPOSITION / INFORMATION ON INGREDIENTS

Ingredient Name	Concentration
Bromacil	80 g/kg
Terbuthylazine	120 g/kg
Related Triazines	0.24 g/kg

3. HAZARD IDENTIFICATION

Hazard Class: WHO Class III -Slightly hazardous.

Main Hazard: Very toxic to aquatic organisms. May cause long term adverse effects in the environment. Poisonous if swallowed. May irritate the nose, skin, throat and eyes.

Flammability: Non-flammable

Chemical Hazard (Bromacil): May generate poisonous and corrosive fumes containing carbon oxide, nitrogen oxides and hydrochloric acid when involved in a fire.

Chemical Hazard (Terbuthylazine): Harmful if swallowed.

Biological Hazard: Highly toxic to algae. Very toxic to aquatic organisms, may cause long term adverse effects in the aquatic environment. Bromacil can seep or leach through soil and can enter ground water which may be used as drinking water. Correct use rates by geographical area and proper mixing-loading site precautions and procedures must be followed to minimize potential bromacil movement into ground water.

4. FIRST AID MEASURES AND PRECAUTIONS

If poisoning is suspected, do not wait for symptoms to develop. Contact a physician, the nearest hospital, or the nearest Poison Control Centre.

Symptoms of Human Poisoning: Some triazines are mildly irritating to skin and upper respiratory tract. The acute toxicity to terbuthylazine for man is thought to be low and no adverse health effects from exposure to this herbicide have been reported.

The triazine herbicides (terbuthylazine) disturb energy metabolism (thiamin and riboflavin functions). Toxicity symptoms include difficulty in walking, tremors, convulsions, paralysis, cyanosis, slowed respiration, miosis (pin point pupils), gut pain, diarrhea and impaired adrenal function.

First Aid Measures:

Skin Contact: Wash skin immediately for at least 15 minutes with fresh running water and soap, including hair and under fingernails. Remove contaminated clothing and wash before re-use. Treat symptomatically.

Eye Contact: Flush immediately with clear clean running water for about 15 minutes. Hold eyelids apart to rinse the entire surface of the eye and lids. If eye symptoms (redness, irritation or pain) persist refer patient to ophthalmologist for examination of eyes.

Ingestion: Seek medical advice immediately. Rinse mouth thoroughly. Give 1 or 2 glasses of water to drink and induce vomiting if person is conscious. Never give anything by mouth to an unconscious person. Apply artificial respiration if necessary. The patient should be kept under observation for at least 48 hr. Treat symptomatically.

Inhalation: Move victim from contaminated area to fresh air. Apply oxygen if necessary. Consult a physician after significant exposure.

Advice to Physician:

Treatment: Ingestions of large amounts (more than 10 mg/kg) occurring less than an hour before treatment, should probably be treated by gastric lavage:

1) Intubate stomach and aspirate contents.

2) Lavage stomach with slurry or activated charcoal in 0.9% saline. Leave 30-50 mg activated in the stomach before withdrawing tube.

3) Sodium sulfate, 0.25 gm/kg in tap water, as a cathartic.

Caution: Ingestion of very large amounts may cause CNS depression. In this case, IPECAC is contraindicated. Also, gastric intubation incurs a risk of hydrocarbon pneumonitis.

For this reason, observe the following precautions:

1) If the victim is unconscious or obtunded and facilities are at hand, insert an endotracheal tube (cuffed, if available) prior to gastric intubation.

2) Keep victim's head below level of stomach during intubation and lavage (Trendelenburg, or left lateral decubitus, with head of table tipped downward). Keep victim's head turned to the left.

3) Aspirate pharynx as regularly as possible to remove gagged or vomited stomach contents.

Ingestions occurring more than an hour before treatment are probably best treated only by activated charcoal, 30-50 gm, and sodium or magnesium sulfate, 0.25 gm/kg, as directed above.

Antidote: There are no specific antidotes for these chemicals. Because manifestations of toxicity do occasionally occur in peculiarly predisposed individuals, maintain contact with victim for at least 72 hours so that unexpected adverse effects can be treated promptly.

5. FIRE FIGHTING MEASURES

Flammability: Non-flammable

Extinguishing Agents: Water spray, dry chemical or foam.

Firefighting: Fire may produce irritating or poisonous vapours, mists or other products of combustion. Firefighters and others that may be exposed should wear full protective clothing and self-contained breathing apparatus. If area is heavily exposed to fire and if conditions permit, let the fire burn itself out since water may increase the area contamination. If conditions permit, cool containers / tanks with spray water.

Special Hazards: May generate poisonous and corrosive fumes containing carbon oxide, nitrogen oxides and hydrochloric acid. Keep upwind. Keep product out of sewers and water sources. Use of contaminated buildings, area and equipment must be prevented until they are properly decontaminated.

6. ACCIDENTAL RELEASE MEASURES (SPILLAGE)

Personal Precautions: Wear protective clothing. Avoid breathing dust. If necessary, wear a self-contained breathing apparatus.

Environmental Precautions: Do not contaminate ponds, waterways or ditches with chemical or used containers. Do not allow product to enter drainage systems, surface or ground water. If the product enters watercourses or sewers or contaminate soil or plants, inform competent authority.

Small Spills: Do not use water to collect spilled product. Collect by sweeping or suction after mixing with bentonite, fossil flour, sand or sawdust into hermetically sealed containers and dispose of according to local regulations.

7. HANDLING AND STORAGE REQUIREMENTS

Suitable Material: This product should only be stored or applied using stainless steel, aluminium, fiberglass or plastic lined containers. Do not mix, store or apply in galvanized or unlined mild steel containers or spray tanks. The product can react with such containers and tanks or produce hydrogen gas which may form a highly combustible mixture that can flash or explode if ignited.

Handling: Harmful if swallowed. Avoid contact with skin, eyes and clothing. Do not leave the product in the applicator for long periods. Use with adequate ventilation. Wash hands before eating, drinking, chewing gum, smoking or using the toilet. Remove clothing immediately if the herbicide gets inside, then wash skin thoroughly using non-abrasive soap and put on clean clothing. Do not apply directly to areas where surface water is present or to intertidal areas below the mean high-water mark. Water used to clean equipment must be disposed of correctly to avoid contamination.

Storage: Store in original sealed containers in a well-ventilated and dry storehouse. Keep away from direct sunlight, open flames, food, seed, animals, children and uninformed persons. Store at temperature not exceeding 40 ºC. Do not leave in applicators for extended periods**.**

8. EXPOSURE CONTROL / PERSONAL PROTECTION

Acceptable Daily Intake (ADI): 0.13 mg/kg human body weight (Bromacil). 0.0035 mg/kg human body weight (Terbuthylazine).

Occupational Exposure Limits (Bromacil): 1 ppm (10 mg/m^3) OSHA TWA

1 ppm (10 mg/m^3) ACGIH TWA

2 ppm ACGIH STEL

1 ppm (10 mg/m^3) NIOSH

Engineering Controls: Ensure adequate ventilation, especially in confined areas. Use outdoors in a well-ventilated area. Comply with occupational safety, environmental, fire, and other applicable regulations.

Personal Protective Equipment:

Clothing: Long-sleeved shirt, long pants, shoes plus socks, protective (impermeable) gloves. Employee must wear appropriate protective clothing and equipment to prevent prolonged skin contact with this product.

Gloves: Protective waterproof (impermeable) rubber or plastic gloves are recommended.

Eye Protection: Wear eye protection.

Respiratory: Avoid inhaling dust. Use effective dust mask.

Other Protection: Do not eat, drink or smoke while handling this product. Prevent contamination of food, feeds, drinking water and eating utensils. After using this product wash hands and face before eating. Take extreme care to avoid dust. Wash accurately (preferably a shower) after work shift. Wash hands during breaks and at the end of the work with soap and water.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Light grey/brown granular herbicide.

Melting Point: 157.5 – 160 ºC for bromacil & 177-179 ºC for Terbuthylazine.

Flash Point: Terbuthylazine > 150 ºC.

Flammability: Non-flammable

Auto Flammability: Stable up to melting point.

Explosive Properties: Airborne bromacil dust may ignite.

Vapor Pressure: No data available.

Solubility in Water (Bromacil): 807 mg/ℓ (pH 5), 700 mg/ℓ (pH 7), 1287 mg/ℓ (pH 9) at 25 ºC.

Solubility in Water (Terbuthylazine): 8.5 mg/ℓ at 20 ºC.

Solubility in Solvent (Bromacil): In ethanol 134 g/ℓ; acetone 167 g/ℓ, acetonitrile 71 g/ℓ, xylene 23.3% aqueous sodium hydroxide 88 g/ℓ, all at 25 ºC. Moderately soluble in acetone, strong aqueous bases, acetonitrile, and ethyl alcohol. Only slightly soluble in hydrocarbons.

Solubility in Solvent (Terbuthylazine): 100 g/ℓ in dimethylformamide; 40 g/ℓ in ethyl acetate; 14.3 g/ℓ in octan-1-ol.

10. STABILITY AND REACTIVITY

Stability: The product is stable when stored under normal storage conditions at normal temperatures.

Conditions to Avoid: Avoid sources of heat, free flames or spark generating equipment. During processing, dust may form explosive mixture in air.

Incompatible Materials: This product should only be stored or applied using stainless steel, aluminum, fiberglass or plastic lined containers. Do not mix, store or apply in galvanized or unlined mild steel containers. The product can react with such containers and tanks or produce hydrogen gas which may form a highly combustible mixture that can flash or explode if ignited. Do not mix with other herbicides or pesticides except for products mentioned on the product label.

Decomposition Products: Thermal decomposition of the product may include toxic and corrosive fumes of chlorides and toxic oxides of carbon and nitrogen.

11. TOXICOLOGICAL INFORMATION

Acute toxicity based on the active ingredient toxicity.

Toxicity of Bromacil:

Acute Oral LD_{50} (rats): 2 000 mg/kg (male); 1 300 mg/kg (female). Slightly toxic by ingestion.

Acute Dermal LD_{50} (rabbits): > 5 000 mg/kg. Slightly toxic.

Acute Inhalation LC_{50} (rat, 4 hr): >4.8 mg/ℓ air. Irritating to respiratory system. All rats tolerated a 4-hour exposure at the equivalent of 4 800 mg/m^3 (4.8 mg/ℓ) indicating a low order of acute inhalation toxicity. Higher concentrations were impractical under test conditions.

Skin and Eye Irritation (rabbit): The compound is a moderate skin irritant, is a mild to moderate eye irritant. Eye contact of bromacil in rabbits, resulted in irritation in the conjunctiva (the mucous membrane lining the eye), but there was no injury to the cornea.

Skin Sensitization (guinea pig): The compound is not a skin sensitizer.

Chronic Effects: Rabbits acutely exposed via dermal route demonstrated no clinical signs of toxicity, and no gross tissue changes were observed at the highest practical dose of 5 000 mg/kg.

Acute inhalation exposure of rats at the highest dose tested (4.8 mg/ℓ) resulted in only general signs of distress, as well as rapid and deep respiration. Toxicity described in animals repeatedly exposed to 0.1, 0.5 or 2.0 mg/ℓ of the compound for two weeks include slightly increased platelet counts and lower serum cholesterol in the group exposed to 2.0 mg/ℓ. Slightly increased liver weights were noted in the groups exposed to 0.5 or 2.0 mg/ℓ. All remaining animals were normal after a 14 day recovery period.

When a massive dose was administered to dogs (5 000 mg/kg), incoordination, salivation, vomiting, weakness, lacrimation and dilated pupils were observed. Toxicity described in animals repeatedly exposed to near lethal doses included liver changes, increased liver, adrenal and heart weights, as well as decreased kidney and spleen weights. In another study, body weights were lower and changes were noted in the liver, kidneys and thyroids in rats repeatedly fed 2 500 ppm in the diet for 90 days. Dogs fed 50, 250 or 1 250 ppm of the compound for two years had no evidence of toxicity in any exposure group. Mice that were administered 250, 1 250 or 5 000 ppm in the diet for 18 months demonstrated reduced growth rates at 1 250 ppm in females and at 5 000 ppm in males. Higher mortality was noted among female mice in the high dose group. Increased incidences of naturally occurring changes in aging mice, including testicular tubule atrophy and liver effects, were observed at the higher doses. The weight of the scientific data for Bromacil suggests that this is not indicative of a similar response in female mice, other laboratory animals or in man. Additional animal testing indicated that this compound was not teratogenic and was not uniquely toxic to the conceptus.

Carcinogenicity: Although Bromacil has not been determined to cause cancer, it is considered by the EPA to be a possible human carcinogen because there is some limited or uncertain evidence that bromacil cause cancer in animals receiving high doses of the chemical over the course of their lifetimes. There was no evidence of carcinogenicity in rats fed 12.5 mg/kg/day of bromacil.

Mutagenicity: Several mutagenic screening tests have not found bromacil to be mutagenic.

Reproductive Hazard: No reproductive effects were observed in rats exposed to 250 ppm in the diet for three generations. The compound does not produce heritable genetic damage in animals. Most studies for genetic damage in mammalian and bacterial cells in culture were also negative.

Toxicity of Terbuthylazine:

Acute Oral LD_{50} (rat): 1590 to 2000 mg/kg

Acute Dermal LD_{50} (rat): > 2 000 mg/kg

Acute Inhalation LC_{50} (rat, 4 hr): > 3.51 mg/ℓ air.

Skin and Eye Irritation (rabbit): No skin or eye irritation.

Skin Sensitization (guinea pig): Not a skin sensitizer.

Chronic Effects: No data available.

Carcinogenicity: Long-term animal studies did not show carcinogenic activity. No human information available.

Mutagenicity: No mutagenic in a series of tests using bacteria, cultured mammalian cells and whole animals. No human information available.

Reproductive Hazard: No data available.

12. ECOLOGICAL INFORMATION

Ecotoxicity of Bromacil:

Aquatic Toxicity Fish LC_{50} (72 hr): 38 ppm (rainbow trout). Very toxic to aquatic organisms, may cause long term adverse effects in the aquatic environment.

Aquatic Toxicity Daphnia LC_{50} (48 hr): 119 mg/ℓ

Aquatic Toxicity Algae EC_{50} (72 hr): 0.013 mg/ℓ. Highly toxic to algae.

Avian Toxicity LD_{50}: 2 250 mg/kg (bobwhite quail).

Bee Toxicity LD_{50}: Non-toxic to bees.

Biodegradability: Duration of residual activity in soil is c. 5 months. The principle metabolite is 5-bromo-3-sec-butyl-6-hydroxymethyluracil. The major mode for the disappearance of bromacil from most treated soils is microbial degradation. Soil diphteroids, Pseudomonas and Penicillium species are among the organisms involved. Tests show that at increased temperatures and long exposures to sunlight, there is very little loss of the herbicide from dry soil. It does not readily volatilize, change into gas, nor does it photo decompose or break down in sunlight. Laboratory studies show that 5-30 % of bromacil is lost six to nine weeks after application to the soil, as carbon dioxide, an odourless, colorless gas.

Bio-accumulation: Log P_{OW} = 1.87 (pH 5 / pH 7)

Mobility: Highly mobile. Bromacil binds, or absorbs, only lightly to soil particles (K_{oc} = 32 g/mℓ), is soluble in water and has a relatively lengthy soil half-life (60 days). For these reasons, bromacil is expected to move (leach) quite readily through the soil and it contaminate groundwater.

Eco-toxicity of Terbuthylazine:

Aquatic Toxicity Fish LC_{50} (96 hr): 3.8-4.6 mg/ℓ (rainbow trout); 52 mg/ℓ (bluegill sunfish); 7 mg/ℓ (carp and catfish)

Aquatic Toxicity Daphnia LC_{50} (48 hr): 21.2 mg/ℓ.

Aquatic Toxicity Algae EC_{50} (72 hr): Highly toxic to algae.

Avian Toxicity LD_{50} (9 days): No data available.

Bee Toxicity LD_{50}: No data available.

Biodegradability: Microbial degradation proceeds mainly by deethylation and hydroxylation, with eventual ring cleavage. DT_{50} 30 – 60 days in biologically active soil.

Bio-accumulation: The product shows little or no tendency to bio accumulate and poses no long-term threat to wildlife.

Mobility: Leaches only slightly. Adsorption on soils is strong: K_d = 2.2-25, K_{oc} = 162-278 are typical values for light agricultural soils. The product is relatively mobile in soil and can result in the contamination of surface and ground water.

13. DISPOSAL CONSIDERATION

Pesticide Disposal: Do not contaminate crops, grazing, rivers or dams with chemical or used containers. Dispose of in approved landfill. Do not allow material to contaminate ground water system. Waste from residues / unused products must be disposed of in accordance with national regulations. Waste must be incinerated in a suitable incineration plant holding a permit by the competent authorities.

Package Product Wastes: Emptied containers retain vapor and product residues. Observe all labeled safeguards until container is cleaned, reconditioned or destroyed. Rinse empty container three times with a volume of water equal to at least one tenth of that of the container. Add the rinsings to the spray tank before perforating and flattening the container. Dispose of in approved landfill or preferably in a pesticide incinerator. Containers that are in good condition may be returned to a drum conditioner for re-use with the same type of pesticide product. Do not contaminate ponds, waterways or ditches with chemical or used containers.

14. TRANSPORT INFORMATION

UN No.: 3077

Class: 9

Packaging Group: III

Proper Shipping Name: Environmentally Hazardous Substance; Solid; N.O.S. (contains Bromacil & Terbuthylazine)

15. REGULATORY INFORMATION

Risk Phrases: **R40-** Possible risks of irreversible effects.

R50/53- Very toxic to aquatic organisms, may cause long term adverse effects in the aquatic environment.

Safety Phrases: **S2-** Keep out of reach of children.

S36/37- Wear suitable protective clothing and gloves.

S60- This material and/or its container must be disposed of as hazardous waste.

S61- Avoid release to the environment. Refer to special instructions / safety data sheets.

National Legislation: This product is registered under Act 36 of 1947 of the Republic of South Africa. It is a violation of South African law to use this product in any manner inconsistent with its approved labelling. Read and follow all label directions.

16. OTHER INFORMATION

Note: Read and understand all the information on the product label before using the product.

Emergency and First Aid Procedures: The chemical information provided has been condensed form original source documents, primarily form: "Morgan, D.P. 1982 Recognition and management of pesticide poisonings, 3rd ed. U.S. Environmental Protection Agency, Washington, DC. 120 pp". This information has been provided in this form for your convenience and general guidance only. In specific cases, further consultation and reference may be required and is recommended. This information is not intended as a substitute for a more exhaustive review of the literature nor for the judgment of a physician or other trained professional.

Disclaimer: The information on this sheet is not a specification; it does not guarantee specific properties. The information is intended to provide general guidance as to health and safety based upon our knowledge of the handling, storage and use of the product. It is not applicable to unusual or non-standard uses of the product, nor where instructions or recommendations are not followed. All information is given in good faith but without guarantee in respect of accuracy, and no responsibility is accepted for errors and omissions or the consequence thereof.

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