

MATERIAL SAFETY DATA SHEET

SECTION 1 — PRODUCT AND COMPANY IDENTIFICATION

Product identifier: FORZA SILVICULTURAL HERBICIDE

Product use: Herbicide.

Supplier's name and address:

Cheminova Canada Inc.

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Kilworth, ON,

Canada N0L 1R0

Phone #: 1-(519)-472-0600 (8 AM to 4:00 PM EST, Monday to Friday)

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MSDS Prepared by: Cheminova Inc.

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Revision reason: Update company address

SECTION 2 — COMPOSITION/INFORMATION ON INGREDIENTS

<u>Ingredients</u>	<u>CAS #</u>	<u>% (weight)</u>	<u>ACGIH TLV (mg/m³)</u>	<u>OSHA PEL (mg/m³)</u>
*Glyphosate as isopropylamine salt	38641-94-0	30 - 60	N/Av	N/Av
Surfactant	61791-26-2	5 - 15	N/Av	N/Av

*Note: The product contains about 480 g/L of the active ingredient Glyphosate as its isopropylamine salt, equivalent to 360 g/L of the free acid Glyphosate (CAS # 1071-83-6).

This material is classified as hazardous under OSHA regulations (29CFR 1910.1200).

SECTION 3 — HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Clear, yellow, viscous liquid, odourless to slight amine-like odor.

Caution! Reacts with materials made of iron, galvanized steel and unlined steel, liberating (releasing) hydrogen, which may ignite.

May cause eye irritation. Contains material which may cause liver and kidney effects.

Dangerous for the environment. Toxic to flora (plants). May be harmful to aquatic organisms.

POTENTIAL HEALTH EFFECTS

Target organs: Eyes, skin, respiratory system, digestive system.

Signs and symptoms of short-term (acute) exposure:

Inhalation: Inhalation may cause irritation to the nose, throat and upper respiratory tract. Symptoms may include coughing and sneezing

Skin contact: Direct skin contact may cause slight irritation.

Eye contact: Direct eye contact may cause moderate irritation and reversible eye injury. Symptoms may include pain, redness and tearing.

Ingestion: This product is not expected to be harmful by oral administration route. Ingestion of large amounts could cause irritation. Symptoms may include nausea, vomiting and diarrhea.

Effects of long-term (chronic) exposure: Prolonged or repeated overexposure may cause liver and kidney effects.

Carcinogenicity: See TOXICOLOGICAL INFORMATION (Section 11).

Other important hazards: See TOXICOLOGICAL INFORMATION (Section 11).

Potential environmental effects: This product is a herbicide and therefore toxic to all green plants. The product is harmful to fish, aquatic invertebrates and aquatic plants. See ECOLOGICAL INFORMATION (Section 12).

SECTION 4 — FIRST AID MEASURES

Inhalation: Immediately remove victim to fresh air. Obtain medical attention if irritation develops or persists.

Skin: Wash skin with soap and running water, while removing contaminated clothing and shoes. Get medical attention if irritation develops or persists. Thoroughly clean contaminated clothing before re-use.

Eyes: Immediately flush eyes with running water for at least 15 minutes. Get medical attention.

Ingestion: If ingested, do not induce vomiting. Have victim drink 6 to 8 ounces of water. Never give anything by mouth if victim is unconscious or convulsing. Obtain medical attention attention.

SECTION 5 — FIRE FIGHTING MEASURES

Fire hazards/conditions of flammability: Combustible liquid. This material may burn when exposed to extreme heat, flame and other ignition sources. Closed containers may build up pressure if exposed to excess heat. Product can react with iron, galvanized steel or unlined steel to produce flammable hydrogen gas. Flammable hydrogen gas can produce a highly combustible mixture with air and this mixture could flash or explode if ignited by heat, sparks and flame.

Flammability classification (OSHA 29 CFR 1910.1200): Class IIIB Combustible Liquid.

Flash point (Method): >235°F / 113°C (Estimated).

Auto-ignition temperature: N/Av

Lower flammable limit (% by volume): N/Av

Upper flammable limit (% by volume): N/Av

Explosion data:

Sensitivity to mechanical impact: Not sensitive.

Sensitivity to static discharge: Not expected to be sensitive to static discharge.

Suitable extinguishing media: For small fires, use dry chemical or carbon dioxide. For large fires, use water spray or foam.

Special fire-fighting procedures/equipment: Firefighters should wear proper chemically protective equipment and self-contained breathing apparatus operated in positive pressure mode. Move containers from fire area if it can be done without risk. Dike area to prevent water run-off. Water spray may be useful in cooling equipment and containers. Avoid spreading burning material with water jet.

Hazardous combustion products: Carbon oxides, nitrogen oxides, phosphorous oxides.

SECTION 6 — ACCIDENTAL RELEASE MEASURES

Personal precautions: Restrict access to area until completion of clean-up. Ensure clean-up is conducted by trained personnel only. All persons dealing with clean-up should wear the appropriate chemically protective equipment. Refer to Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION, for additional information on acceptable personal protective equipment.

Environmental precautions: Ensure spilled product does not enter drains, sewers, waterways, or confined spaces.

Spill response/Cleanup: Eliminate all sources of heat, sparks and flame. Ventilate area of release. Stop leak if you can do so without risk. For spills on the floor or other impervious surfaces, absorb spill with inert, non-combustible absorbent material, such as hydrated lime, Fuller's earth or other absorbent clays. Scoop up and place contaminated absorbent material into suitable containers for later disposal (see Section 13). Clean the spill area with soap and water, then rinse thoroughly. Do not flush to sewer or allow to enter confined spaces. Large spills that soak into the ground should be dug up, placed in suitable containers and disposed of appropriately (see Section 13). Notify the appropriate authorities.

Prohibited materials: Do not use containers made of iron, galvanized steel or unlined steel.

Special spill response procedures: If a spill/release in excess of EPA reportable quantity is made into the environment, immediately notify the national response center (phone: 1-800-424-8002).

EPA/CERCLA Reportable quantity: None known.

SECTION 7 — HANDLING AND STORAGE

Safe handling procedures: This material is a harmful liquid. Wear appropriate protective equipment during handling. Use only in well ventilated area. Avoid contact with eyes, skin and clothing. Do not inhale vapors or mists. Keep away from all unprotected persons and children. Do not use near sources of heat, flame or ignition sources. **This product should be mixed, stored or applied using only stainless steel, fibreglass, plastic or plastic-lined containers and equipment.** This product can react with containers made of iron, galvanized steel and unlined steel to produce flammable hydrogen gas which may form a highly combustible gas mixture with air. Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark. Keep away from bases and incompatibles. Use caution when opening containers. Keep container tightly closed when not in use. Wash thoroughly after handling.

Storage recommendations: Store in a cool, dry, well ventilated area away from incompatibles. Protect container from physical damage. No smoking in the area. Inspect containers periodically for damage or leaks.

Special packaging materials: Always keep in containers made of the same materials as the supply container.

SECTION 8 — EXPOSURE CONTROLS AND PERSONAL PROTECTION

Ventilation and engineering controls: If handled indoors, general room ventilation may not be sufficient. Provide mechanical exhaust ventilation to keep concentrations below specified TLV's and PEL's.

Respiratory protection: This product is not likely to present an airborne exposure concern during normal handling. In the event of an accidental discharge of the material during manufacturing or handling, which produces a heavy vapor or mist, workers should put on respiratory protection. Wear respirators approved by MSHA / NIOSH. Advice should be sought from respiratory protection specialists.

Protective gloves: Wear impervious chemical gloves, such as barrier laminate, butyl rubber, nitrile rubber or viton. Advice should be sought from glove suppliers.

Eye protection: Wear safety glasses with side shields or chemical splash goggles to prevent vapors or mists from entering the eyes. If using a full face shield, always use safety glasses or goggles along with the face shield to ensure adequate protection of the eyes.

Other protective equipment: Wear appropriate protective clothing to prevent skin contact. Other protective equipment, such as an eyewash station and safety shower, may be required depending on exposure and on workplace standards.

Permissible exposure levels: See Section 2.

General hygiene considerations: Avoid breathing vapors or mists. Avoid contact with eyes, skin and clothing. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco or using the toilet. Remove contaminated clothing and wash before re-use.

SECTION 9 — PHYSICAL AND CHEMICAL PROPERTIES

Physical state, odor and appearance: Clear, yellow, viscous liquid, odorless to slight amine-like odor.

Odor threshold: N/Av

Specific gravity (water = 1): 1.165 g/cm³ @ 68°F/20°C.

Solubility in water: The product is miscible with water (solubility free Glyphosate acid: 10.5 g/L @ 68°F/20°C).

pH: 4.5 @ 68°F / 20°C (1% aqueous solution).

Boiling point: 235°F / 113°C

Melting/freezing point: <32°F / 0°C.

Vapour density (Air=1.0): N/Av

Percent Volatile by Weight: N/Av

Evaporation rate (n-BuAc=1.0): N/Av

Vapour pressure: 1.75 x 10⁻⁷ mmHg (1.31 x 10⁻⁵ Pa) @ 77°F / 25°C (free Glyphosate acid).

Coefficient of n-Octanol/water distribution: P = 4.5 x 10⁻⁴ (free Glyphosate acid); Log P = -3.3 (free Glyphosate acid)

Viscosity: 43 centistokes @ 68°F / 20°C; 18 centistokes @ 104°F / 40°C.

Surface Tension: 39 mN/m @ 68°F / 20°C (1% solution in water).

SECTION 10 — REACTIVITY AND STABILITY DATA

Stability and reactivity: This product is stable at ambient temperatures. This product can react with containers made of iron, galvanized steel and unlined steel to produce flammable hydrogen gas which may form a highly combustible gas mixture with air. This gas mixture could flash or explode when exposed to heat, sparks, flame, welder's torch, lighted cigarettes or other ignition sources.

Hazardous polymerization: Hazardous polymerisation does not occur. The product does react with caustic (alkaline) materials to liberate heat, however this is an acid-base neutralization reaction and is not polymerisation.

Conditions to avoid: Avoid heat, flame and direct sunlight.

Materials to avoid (incompatibles): Alkalies, iron, galvanized steel and unlined steel.

Hazardous decomposition products: None known. Refer to 'Hazardous combustion products', Section 5.

SECTION 11 — TOXICOLOGICAL INFORMATION

Routes of exposure: Skin contact, eye contact, inhalation, and ingestion.

Toxicological data: LC₅₀ (mg/L/4 hrs) = >4.86 (maximum attainable concentration; no signs of toxicity at this concentration).

LD₅₀, oral, rat (mg/kg) = >5000

LD₅₀, dermal, rat (mg/kg) = >2000

Carcinogenicity: There are no materials in this product, which are classified as carcinogenic by IARC, ACGIH, OSHA or NTP.

Teratogenicity, mutagenicity, other reproductive effects: None known.

Sensitization to material: None known.

Synergistic materials: Not available.

Conditions aggravated by exposure: Pre-existing eye disorders.

SECTION 12 — ECOLOGICAL INFORMATION

Chemical fate information: The product, however, should not be allowed to enter drains or water courses or be deposited where it can affect ground or surface waters. Do not discharge product unmonitored into the environment. The active ingredient, Glyphosate, is rapidly deactivated by absorption to clay particles. Glyphosate binds strongly to soil. The active ingredient, Glyphosate, is not readily biodegradable. It undergoes slow degradation in the environment and in waste water treatment plants. No adverse effects are found at concentrations up to 100 g/L in waste water treatment plants. Degradation is mainly microbiological. Aerobic degradation is most important, but anaerobic degradation does also occur. Degradation half-lives in the environment vary much with circumstances, but are usually around 3 – 30 days in aerobic soil and water. The risk of bioaccumulation is considered to be low. Several studies regarding bioaccumulation of glyphosate have been performed, both in marine and freshwater systems. The calculated bioaccumulation factors are low.

Ecotoxicological information: This product is a herbicide and therefore toxic to all green plants. The product is harmful to fish, aquatic invertebrates and aquatic plants. It is considered to be less harmful to birds and soil micro- and macroorganisms. The acute toxicity of the product is measured to be:

Fish – 96-Hr LC₅₀, Rainbow trout (*Salmo gairdneri*) = 18.6 mg/L (static).

21-day NOEC, Rainbow trout (*Salmo gairdneri*) = 0.43 – 0.81 mg/L

96-Hr LC₅₀, Bluegill sunfish (*Lepomis macrochirus*) = 11.9 mg/L (static)

Invertebrates – 48-Hr EC₅₀, Daphnids (*Daphnia magna*) = 21.6 mg/L.

21-day NOEC, Daphnids (*Daphnia magna*) = 1.5 mg/L

Algae - 72-Hr IC₅₀, Green Algae (*Scenedesmus subspicatus*) = 17.4 mg/L.

96-Hr IC₅₀, Green Algae (*Scenedesmus subspicatus*) = 2.2 mg/L

Plants: 7-day EC₅₀, Duckweed (*Lemna gibba*) = 27 mg/L.

Earthworms: 14-day LC₅₀, (*Eisina foetida*) = >1000 mg/kg dry soil.

Birds: LD₅₀, Japanese quail (*Coturnix japonica*) = 1900 mg/kg

5-day dietary LD₅₀, Japanese quail (*Coturnix japonica*) = >5000 ppm in feed.

Bees - 48-Hr LD₅₀, Worker honey-bees (*Apis mellifera*), acute oral = >100 µg/bee.

24-Hr LD₅₀, Worker honey-bees (*Apis mellifera*), topical = >20 µg/bee

Bacteria: IC₅₀, Activated sludge = >100 mg/kg.

SECTION 13 — DISPOSAL CONSIDERATIONS

Handling for disposal: Handle waste according to recommendations in Section 7.

Methods of disposal: Do not contaminate water, foodstuffs, feed or seed by storage or disposal. Triple rinse (or equivalent) containers, then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill. Disposal must be in compliance with all Federal, State and local regulations. Contact your local, state or federal environmental agency for specific rules.

SECTION 14 — TRANSPORTATION INFORMATION

US 49 CFR information: Not regulated for transport.

Canadian Transportation of Dangerous Goods Clear Language (CLR) information: Not regulated for transport.

SECTION 15 — REGULATORY INFORMATION

Canada:

WHMIS information: This product is a Pest Control Product and is not regulated as a Controlled Product under the Hazardous Products Act (HPA). However, for reference purposes only, this product would have the following WHMIS Classification if it were regulated as a Controlled Product under the HPA: **Class D2B** (*Materials causing other toxic effects, Toxic Material*).

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and this MSDS contains all the information required by the CPR.

United States:

California Proposition 65 information: This product does not contain any chemicals known to the state of California to cause cancer or reproductive harm.

EPA/CERCLA Reportable Quantity (RQ): None known.

SARA TITLE III: *Sec. 313, Toxic Chemicals Notification, 40 CFR 372:* This material is not known to contain any Toxic Chemical constituents.

SECTION 16 — OTHER INFORMATION

HMIS Rating: *2 Health; 1 Flammability; 0 Reactivity

Legend: ACGIH – American Conference of Governmental Industrial Hygienists

CAS - Chemical Abstract Service

CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act of 1980

CFR – Code of Federal Regulations

EPA – Environmental Protection Agency

HMIS – Hazardous Materials Identification System

IARC – International Agency for Research on Cancer

Inh – Inhalation

MSHA – Mine Safety and Health Administration

N/Ap – Not Applicable

N/Av – Not Available

NIOSH – National Institute for Occupational Safety and Health

NTP – National Toxicology Program

OEHHA – Office of Environmental Health Hazard Assessment

OSHA – Occupational Safety and Health Act

PEL - Permissible Exposure Limit

PMCC – Pensky Martins Closed Cup

RCRA – Resource Conservation and Recovery Act

SARA - Superfund Amendments & Reauthorization Act

TLV – Threshold Limit Value

TSCA – Toxic Substances Control Act

TWA - Time Weighted Average

WHMIS – Workplace Hazardous Materials Information System

References:

1. ACGIH, Threshold Limit Values and Biological Exposure Indices for 2003.
2. Canadian Centre for Occupational Health and Safety, CCInfoWeb databases, 2003 (Chempendium and RTECs).
3. Material Safety Data Sheet from manufacturer.
4. International Agency for Research on Cancer Monographs, Supplement 7, 1988.
5. US EPA Title III List of Lists – October 2001 version.
6. California's OEHHA Proposition 65 List – July 11, 2003 version.

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