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READ THE ENTIRE LABEL BEFORE USING THIS PRODUCT.

USE ONLY IN ACCORDANCE WITH INSTRUCTIONS.

KEEP OUT OF REACH OF CHILDREN

ZANTAN 60 SL

INGREDIENTS

2,4-D.....60%
Other ingredients40%

ZANTAN 60 SL is a highly effective herbicide against broadleaf weeds and annual grasses, and contains as its active ingredient 2,4-D 60 SL.

ZANTAN 60 SL can be used on cereal, wheat, maize and rice crops; orchard floors, weeds and brush in rangelands, pastures, rights-of-way, and similar non-crop uses; tree injection and for aquatic weed control.

Trade Names Of Other Firms: Trade names for products containing 2,4-D include Aqua-Kleen, Barrage, Lawn-Keep, Malerbane, Planotox, Plantgard, Savage, Salvo, Weedone, and Weedtrine-II.

What is ZANTAN and how does it work?

2,4-D, a chlorinated phenoxy compound, functions as a systemic herbicide and is used to control many types of broadleaf weeds.

As a plant-growth regulator, ZANTAN 80 WP stimulates nucleic acid and protein synthesis and affects enzyme activity, respiration, and cell division. It is absorbed by plant leaves, stems, and roots and moves throughout the plant. It accumulates in growing tips.

It is used in cultivated agriculture, in pasture and rangeland applications, forest management, home, garden, and to control aquatic vegetation. It was the first successful selective herbicide and allowed for greatly enhanced weed control in wheat, maize (corn), rice, and similar cereal grass crop, because it only kills dicots, leaving behind monocots. It may be found in emulsion form, in aqueous solutions (salts), and as a dry compound.

Key Benefits of ZANTAN 60 SL:

- 1) Third most widely used herbicide in North America
- 2) Quick knockdown effect.
- 3) Trusted performance. Reliable.
- 4) Used worldwide over many years by major partners.

PRECAUTIONS

Causes severe eye damage. Do not get in eyes. Keep out of reach of children.

May be fatal if absorbed through skin. Wear overalls over long pants, and a long-sleeved shirt, goggles or a face shield, apron and chemical resistant gloves during mixing, loading, clean-up and repair activities. Wear pants, a long-sleeved shirt and chemical resistant gloves during application.

Do not enter or allow worker entry into treated areas during the restricted entry interval of 48 hours.

SYMPTOMS OF POISONING

Corrosive, cause irreversible eye damage. Do not get in eyes or on clothing. Wear goggles. Harmful if swallowed. Harmful if absorbed through skin. Avoid contact with skin. Harmful if inhaled. Avoid breathing spray mist. Wash thoroughly with soap and water after handling. Remove contaminated clothing and wash before reuse.

MEDICAL TREATMENT

Treatment is symptomatic.

FIRST AID

Eye: Immediately flush with plenty of water. Continue for at least 15 minutes. If easy to do, remove contact lenses. Obtain medical attention from an eye specialist.

Skin: Wash affected skin with plenty of water. Take off contaminated clothing, wristwatch, jewellery. If there are persistent symptoms, obtain medical advice. Wash clothes and clean shoes before reuse.

Inhalation: Move to fresh air.

Ingestion: Rinse mouth thoroughly with water. Never give anything by mouth to an unconscious person. Do not induce vomiting unless directed by medical personnel. If symptoms occur, get medical attention.

Advice to doctors: This product is not an inhibitor of cholinesterase.

Antidote: Treatment with atropine and oximes is not indicated.

DIRECTIONS OF USE

Small grains

Spring postemergent (not underseeded with legumes)

Crop	Normal rates (safe to crop)	Higher rates*
Wheat	2/3 – 1.5 pints	1 – 3 pints
Barley		
Rye		
Oats	0.5 – 1 pint	1 ½ - 2 pints
Millet	2/3 – 1 1/3 pints	2 – 3 pints

Spray when weeds are small after grain begins tillering but before boot stage (usually 4-8 inches tall) Do not apply before the tiller stage nor from early boot through milk stage. To control large weeds that will interfere with harvest or to suppress perennial weeds, preharvest treatment can be applied when the grain is in the dough stage. Best results will be obtained when soil moisture is adequate for plant growth and weeds are growing well.

Spring planted oats: Apply in sufficient water to give good coverage. Apply after the fully tillered stage, except during the boot to dough stage.

Fall planted oats: Apply after full tillering but before early boot stage. Some difficult weeds may require the higher rates of 1 to 1 ½ pints per acre for maximum control but injury may result. Do not spray during or immediately following cold weather.

Spring postemergent (underseeded with legumes)

Crop	Normal rates (safe to crop)	Higher rates*
Wheat	¼ to ½ pints	
Barley		
Rye		

Apply ¼ to ½ pint after grain is 8 inches tall. Do not spray grain in boot to dough stage. Do not apply alfalfa or sweet clover unless the infestation is severe and injury to these legumes can be tolerated. Preharvest treatment can be applied when the grain is in the dough stage. Best results will be obtained when soil moisture is adequate for plant growth and weeds are growing well.

Pre harvest (dough stage)

Crop	Normal rates (safe to crop)	Higher rates*
Wheat	1 – 2 pints	2 -3 pints
Barley		
Rye		

For emergency weed control in wheat: Perennial broadleaf weeds – apply 3 pints per acre when weeds are approaching bud stage. Do not spray grain in the boot to dough stage. The 3 pint per

acre application can produce injury to wheat. Balance the severity of your weed problem against the possibility of crop damage. Where perennial weeds are scattered, spot treatment is suggested to minimise the extent of crop injury.

Corn (field and sweet)

Crop	Normal rates (safe to crop)	Higher rates*
Preplant	1 – 2 pints	
Preemergent	2 - 4 pints	
Emergent	1 pint	1 ½ pints
Post emergent Up to 8 inches tall	½ - 1 pint	
Post emergent 8 inches to tasseling (use only directed spray)	1 pint	1 ½ pints
Preharvest	1 – 2 pints	

Preplant: To control emerged broadleaf weed seedlings or existing cover crops prior to planting corn, apply 7 to 14 days before planting. Do not use on light, sandy soil or where soil moisture is inadequate for normal weed growth. Use high rate for less susceptible weeds or cover crops such as alfalfa.

Pre-emergent: Apply product from 3-5 days after planting but before corn emerges. Do not use on very light sandy soils. Use higher rates on heavy soils. Plant corn as deep as practical.

Post-emergent: Best results are usually obtained when weeds are small and corn is 5 to 18 inches tall. When corn is over 8 inches tall, use drop nozzles to keep spray off foliage as much as possible. Do not apply from tasseling to dough stage. If corn is growing rapidly and temperature and soil moisture are high, use ½ pint per acre rate to reduce possibility of crop damage. Delay cultivation for 8 to 10 days to prevent stalk breakage due to temporary brittleness caused by ZANTAN 60 SL. Application rates of up to 1 pint per acre may be used to control some hard-to control weeds. However the possibility of injury to the corn is increased. Do not use with atrazine, oil or other adjuvants.

Sorghum (Post emergent)

Crop	Normal rates (safe to crop)	Higher rates*
6 – 8 inches tall	2/3 – 1 pint	
8 – 15 inches tall (use only directed spray)	1 pint	2 – 3 pints

Apply to sorghum when crop is 4 to 12 inches high with secondary roots well established. Use drop nozzles when crop is over 10 inches high. Do not apply from flowering to dough stage. Rates of up to 1 pint per acre may be used to

control some hard-to-control weeds. However, the chance of crop injury increases with the higher rates. Do not use with oils. Use lower rates if conditions of high temperature and high soil moisture exist.

Rice

Crop	Normal rates (safe to crop)	Higher rates*
Preplant	1 – 2 pints	
Post emergent	1 – 2 ½ pints	2 – 3 pints

For preplant use, apply 4 or more weeks prior to planting. For postemergent use, apply in the tillering stage of rice development at the time of first joint development (first to second green ring) usually 6 to 9 weeks after emergence. Do not apply after panicle initiation, after rice internodes exceed ½ inches, at early seedling, early panicle, boot, flowering or early heading growth stages.

Sugarcane

Crop	Normal rates (safe to crop)	Higher rates*
Pre-emergent	4 pints	
Post emergent	4 pints	

* - The higher rates as recommended above may be necessary to control difficult weed problems, such as dry conditions in the western states. They should not be used unless possible crop injury is acceptable.

DISPOSAL METHODS

Do not dispose of undiluted chemicals on site. If recycling, replace cap and return clean containers to recycler or designated collection point. Triple rinse (or equivalent), adding rinsate to spray tank. If not recycling, break, crush, or puncture and bury empty containers in a local authority landfill. If no landfill is available, bury the containers below 500 mm in a disposal pit specifically marked and set up for this purpose clear of waterways, desirable vegetation and tree roots. Empty containers and product should not be burnt.

STORAGE CONDITION

Do not contaminate water, food or feed by storage. Do not store this product near fertilizers, seeds, insecticides or fungicides. Store in the closed, original container in a cool, well-ventilated area. Protect from freezing. If stored below freezing, the product must be warmed to at least 70°F and agitated before using. Do not store for prolonged periods in direct sunlight. Store in a locked room or place away from children, animals, food, feedstuffs, seed and fertilizers. Triple or preferably pressure rinse containers

before disposal. Add rinsing to spray tank

For More Details including effects on environment email contact@ivorychem.com with Subject "ZANTAN 60 SL DETAILS"

More Details:

TOXICOLOGICAL EFFECTS

- **Acute toxicity:** The acid form is of slight to moderate toxicity. The oral LD50 of 2,4-D ranges from 375 to 666 mg/kg in the rat, 370 mg/kg in mice, and from less than 320 to 1000 mg/kg in guinea pigs. The dermal LD50 values are 1500 mg/kg in rats and 1400 mg/kg in rabbits, respectively [1,5,7]. In humans, prolonged breathing of 2,4-D causes coughing, burning, dizziness, and temporary loss of muscle coordination [1]. Other symptoms of poisoning can be fatigue and weakness with possible nausea. On rare occasions following high levels of exposure, there can be inflammation of the nerve endings with muscular effects [25].
- **Chronic toxicity:** Rats given high amounts, 50 mg/kg/day, of 2,4-D in the diet for 2 years showed no adverse effects. Dogs fed lower amounts in their food for 2 years died, probably because dogs do not excrete organic acids efficiently. A human given a total of 16.3 g in 32 days therapeutically, lapsed into a stupor and showed signs of incoordination, weak reflexes, and loss of bladder control [1,5,7].
- **Reproductive effects:** High levels of 2,4-D (about 50 mg/kg/day) administered orally to pregnant rats did not cause any adverse effects on birth weights or litter size. Higher doses (188 mg/kg/day) resulted in fetuses with abdominal cavity bleeding and increased mortality [1,5,7]. DNA synthesis in the testes was significantly inhibited when mice were fed large amounts (200 mg/kg/day) of 2,4-D [7]. The evidence suggests that if 2,4-D causes reproductive effects in animals, this only occurs at very high doses. Thus reproductive problems associated with 2,4-D are unlikely in humans under normal circumstances.
- **Teratogenic effects:** 2,4-D may cause birth defects at high doses. Rats fed 150 mg/kg/day on days 6 to 15 of pregnancy had offspring with increased skeletal abnormalities, such as delayed bone development and wavy ribs [7]. This suggests that 2,4-D exposure is unlikely

to be teratogenic in humans at expected exposure levels.

- **Mutagenic effects:** 2,4-D has been very extensively tested and was found to be nonmutagenic in most systems. 2,4-D did not damage DNA in human lung cells. However, in one study, significant effects occurred in chromosomes in cultured human cells at low exposure levels [26]. The data suggest that 2,4-D is not mutagenic or has low mutagenic potential.
- **Carcinogenic effects:** 2,4-D fed to rats for 2 years caused an increase in malignant tumors [7]. Female mice given a single injection of 2,4-D developed cancer (reticulum-cell sarcomas) [7]. Another study in rodents shows a low incidence of brain tumors at moderate exposure levels (45 mg/kg/day) over a lifetime [1,7]. However, a number of questions have been raised about the validity of this evidence and thus about the carcinogenic potential of 2,4-D. In humans, a variety of studies give conflicting results. Several studies suggest an association of 2,4-D exposure with cancer. An increased occurrence of non-Hodgkin's lymphoma was found among a Kansas and Nebraska farm population associated with the spraying of 2,4-D [25,27]. Other studies done in New Zealand, Washington, New York, Australia, and on Vietnam veterans from the U.S. were all negative. There remains considerable controversy about the methods used in the various studies and their results [28]. Thus, the carcinogenic status of 2,4-D is not clear.
- **Organ toxicity:** Most symptoms of 2,4-D exposure disappear within a few days, but there is a report of liver dysfunction from long-term exposure [1,25].
- **Fate in humans and animals:** The absorption of 2,4-D is almost complete in mammals after ingestion and nearly the entire dose is excreted in the urine. The compound is readily absorbed through the skin and lungs. Men given 5 mg/kg excreted about 82% of the dose as unchanged 2,4-D. The half-life is between 10 and 20 hours in living organisms. There is no evidence that 2,4-D accumulates to significant level in mammals or in other organisms [20]. Between 6 and 8 hours after doses of 1 mg/kg, peak concentrations of 2,4-D were found in the blood, liver, kidney, lungs, and spleen of rats. There were lower levels in muscle and brain. After

24 hours, there were no detectable tissue residues. Only traces of the compound have been found in the milk of lactating animals for 6 days following exposure. 2,4-D passes through the placenta in pigs and rats. In rats, about 20% was detected in the uterus, placenta, fetus, and amniotic fluid [27]. Chickens given moderate amounts of 2,4-D in drinking water from birth to maturity had very low levels of the compound in eggs [7].

ECOLOGICAL EFFECTS

- **Effects on birds:** 2,4-D is slightly toxic to wildfowl and slightly to moderately toxic to birds. The LD50 is 1000 mg/kg in mallards, 272 mg/kg in pheasants, and 668 mg/kg in quail and pigeons [5-7].
- **Effects on aquatic organisms:** Some formulations of 2,4-D are highly toxic to fish while others are less so. For example, the LC50 ranges between 1.0 and 100 mg/L in cutthroat trout, depending on the formulation used. Channel catfish had less than 10% mortality when exposed to 10 mg/L for 48 hours [1,9]. Green sunfish, when exposed to 110 mg/L for 41 hours, showed no effect on swimming response. Limited studies indicate a half-life of less than 2 days in fish and oysters [24]. Concentrations of 10 mg/L for 85 days did not adversely affect the survival of adult dungeness crabs. For immature crabs, the 96-hour LC50 is greater than 10 mg/L, indicating that 2,4-D is only slightly toxic. Brown shrimp showed a small increase in mortality at exposures of 2 mg/L for 48 hours [7,20].
- **Effects on other organisms:** Moderate doses of 2,4-D severely impaired honeybees' brood production. At lower levels of exposure, exposed bees lived significantly longer than the controls. The honeybee LD50 is 0.0115 mg/bee [6,7].

ENVIRONMENTAL FATE

- **Breakdown in soil and groundwater:** 2,4-D has low soil persistence. The half-life in soil is less than 7 days [21]. Soil microbes are primarily responsible for its disappearance [20]. Despite its short half-life in soil and in aquatic environments, the compound has been detected in groundwater supplies in at least five States and in Canada [20]. Very low concentrations have also been detected in surface waters throughout

- the U.S. [23].
- **Breakdown in water:** In aquatic environments, microorganisms readily degrade 2,4-D. Rates of breakdown increase with increased nutrients, sediment load, and dissolved organic carbon. Under oxygenated conditions the half-life is 1 week to several weeks [20].
 - **Breakdown in vegetation:** 2,4-D interferes with normal plant growth processes. Uptake of the compound is through leaves, stems, and roots. Breakdown in plants is by a variety of biological and chemical pathways [10]. 2,4-D is toxic to most broad leaf crops, especially cotton, tomatoes, beets, and fruit trees [7].

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Company Registration No 200405572W

PHYSICAL PROPERTIES AND GUIDELINES

Physical Properties:

- **Appearance:** 2,4-D is a white powder [6].
- **Chemical Name:** (2,4-dichlorophenoxy)acetic acid [6]
- **CAS Number:** 94-75-7
- **Molecular Weight:** 221.04
- **Water Solubility:** 900 mg/L @ 25 C (acid) [5]
- **Solubility in Other Solvents:** ethanol v.s.; diethyl ether v.s.; toluene s.; xylene s. [6]
- **Melting Point:** 140.5 C [6]
- **Vapor Pressure:** 0.02 mPa @ 25 C (acid) [5]
- **Partition Coefficient:** 2.81 [20]
- **Adsorption Coefficient:** 20 (acid) [21]



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Incorporated in the Republic of Singapore Under the Companies Act (Cap 50)