

Wildlife Research Center
Denver, Colorado

CONTROL METHODS

UPLAND ECOLOGY

PESTICIDES

MANAGEMENT

WETLANDS

MIGRATION

BIOCHEMISTR

EVALUATION PROCEDURES AND STANDARDS

CHEMICAL SCREENING AND DEVELOPMENT FOR FOREST WILDLIFE DAMAGE

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Fish and Wildlife Service
Bureau of Sport Fisheries and Wildlife
Branch of Wildlife Research

October 1963

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EVALUATION PROCEDURES

Problem

Forest and range rehabilitation is necessary to our nation's resources in meeting the requirements of a growing population. Animal damage is one of the major factors limiting reforestation and range revegetation. The monetary value of this damage is appreciable. As an example, animal damage to forest crops in the Douglas-fir region of the Pacific Northwest alone is estimated at 12 to 15 million dollars annually.

Both game and non-game mammals are involved and inflict various types of damage. Small rodent and shrews have at times completely defeated reseeding programs through consumption of seeds. Mice, rabbits, hares, mountain beavers, and deer may browse the seedlings, both planted and wildlings, that become established. Mice also girdle young seedlings; and squirrels, porcupines, and even bear attack saplings and mature trees.

Animal damage is a complex problem. The solution will require many management techniques, an important one being chemical protectants. Numerous chemical formulas, each designed for a specific purpose, will be needed.

The Bureau of Sport Fisheries and Wildlife has a vital interest in the development of chemical protectants for use in wildlife management. Since the market for these chemicals is limited, extensive development of compounds by the chemical industry for this purpose may not be justified. A cooperative program is the best approach. Success in such a program will require the combined efforts of the chemical industry, wildlife research, and forest land management groups.

Selection of Compounds

Compounds that are received at the Denver Wildlife Research Center may either be solicited or provided by chemical companies under terms of an agreement. Selection of solicited compounds is by Center personnel and is based on available information often derived through discussions with chemical company representatives. Ordinarily these compounds have been developed for another use and are either on the market or in the late stages of development. The compounds submitted under terms of an agreement are selected by the supplier and generally are coded. These chemicals are chosen during early evaluation and are not necessarily being developed for a specific purpose. The selections are usually based on screening tests, results with related compounds, or because they represent new and interesting chemical groups.

An exact check list for selecting a candidate compound is difficult to establish; every guiding rule would have an exception. Three properties of a chemical, however, should be considered. The first and most important is whether there is evidence or suspicion of biological activity on mammals.

The other two considerations are that the compounds be reasonably stable and non-phytotoxic. There are all degrees of activity which may be greatly influenced by formulation, thereby leaving some latitude for discretion. Chemicals of two major types are desired: mammal repellents and toxicants. Repellents, to have broad usage, must possess relatively low mammalian toxicity to insure a margin of safety between accepted levels and those levels producing adverse effects. In contrast, the toxicants, to be effective, should be well accepted and possess high mammalian toxicity. Compounds of both types which are believed to be absorbed and translocated by plants are of special interest.

Many factors must be considered in the ultimate acceptance or rejection of a compound. Cost of production, ease of formulation, hazard to the handlers, side effects to animals other than the target species and, of course, the effectiveness in regard to intended use must all be weighed.

Submitting Compounds

All available information on a compound should accompany it at the time it is submitted to the Denver Wildlife Research Center for evaluation. Submission forms are available in case there are no data sheets. A minimum of 4 grams of technical grade chemical is needed for the initial evaluations. If the chemical is selected for testing at the Olympia, Washington field station, an additional 150-gram sample is required.

A portion of the sample will not be used if the compound is rejected during early testing phases. It is suggested that instructions be given regarding disposal of unused portions; these will be returned to the company upon request or destroyed.

Reporting

The initial bicassay and phytotoxicity tests are usually completed and the results reported to the chemical company within 60 days of receipt of the compound. Occasionally, however, factors such as unavailability of animals interrupt the evaluation schedule.

Studies conducted at the Olympia field station are by necessity seasonal. To standardize the conditions of the foliage and to permit transplanting, the tests are restricted to the "dormant" period, mid-October through mid-March. Reporting of compounds sent to the field station will, therefore, depend upon the time the compound is received. Compounds received prior to October and perhaps as late as the first of January would be scheduled for evaluation during that testing season. Results of nursery phytotoxicity tests would not be available until mid-summer.

Testing Procedures

Compounds received at Denver are assigned a Denver Research Center (DRC) number which is used to identify the compound during the entire evaluation process. The initial test determines if the compound is biologically

active on mammals. The next test, restricted to the active compounds, defines the type and degree of activity through determining the approximate lethal dose (AID). Following seed and foliar phytotoxicity tests, the better compounds are discussed with the supplier. Some materials are rejected at this point because of other factors such as production costs. A sample of each of the surviving chemicals is then sent to the Olympia field station in Washington for an evaluation of its effects on several target species of mammals held in outdoor pens. Field testing under varied forest conditions is then conducted to complete the evaluation program. A more detailed description of the individual tests is as follows:

Initial Bioassay

The candidate chemical is applied to sized white wheat at an arbitrary level of 2 percent by weight. Chemicals are applied onto wheat kernels by the simplest practical method, minimizing chemical interaction of additives. Live-trapped native deer mice (Peromyscus maniculatus) are the test animals. Five individually caged mice are offered 25 treated wheat seeds each day for 3 consecutive days. The animals are then observed 4 days for chronic effects, completing the initial bioassay test. Standard laboratory rat pellets are available in the cages as a sustaining ration.

Because contamination by urine or feces precludes accurate weight determination, the treated seeds are counted into and out of dishes which are placed in the cages every 24 hours. The number of treated seed consumed by individual animals is recorded on the bicassay forms, and at the end of the test period the percent food reduction is computed. Animal mortality is designated by a red bar placed after the number of seed consumed for that day. The letter "K" indicates that the animal "kibbled" or avoided the chemical by carefully "chipping" off the treated bran coat. The amount of "kibbling" is not a measurable factor but is considered when decisions are made regarding acceptance or rejection of the chemical for additional testing. A number following an oblique line refers to seed dropped from the cage onto the paper below. This factor is not weighed in calculations unless the number of dropped seeds is so high that it restricts consumption by the test animals.

If a compound exhibits a sufficient degree of activity, i.e., avoidance or mortality, it is subjected to the second test, which defines the type of activity. Mortality of 60 percent of the test animals and/or 50 percent reduction in food intake is the minimum degree of activity acceptable for further testing.

Approximate Lethal Dose (ALD) Determination

If a high degree of mortality occurs on the initial bicassay test, toxicity is obvious; however, if seed is avoided, the property of the compound is not apparent. Frequently toxic compounds are avoided at the concentration offered. Therefore, when a chemical is avoided, the next step is to ascertain why. Logically, an ALD is determined since this

information should disclose the true nature of the avoidance. With highly toxic compounds that are not well accepted at the initial concentration, another concentration is tried based on the calculated toxicity of the compound. Knowledge of toxicity will also indicate when a compound is exhibiting repellency rather than sublethal effects.

The test is a slight modification of the method described by William Deichman and T. LeBlanc (1943). Using about six animals, this method makes possible a determination within broad limits of the approximate lethal dose. This test employs graduated concentrations, each one 50 percent higher than the preceding one, starting at 0.001. The approximate lethal dose is the lowest concentration that kills the animal. The starting point is arbitrarily selected by the investigator based upon available information.

The formulation used for the ALD determination is usually a suspension of the chemical in corn oil, water, or a 1 percent solution of Carbopol. The chemical is administered by oral injection, and the animals are observed for a period of 2 or 3 days.

Seed Phytotoxicity

Protection of seed from depredation by animals requires that the chemical agent employed be tolerated by the seed, thereby allowing the seed to germinate and develop normally. The third step in the evaluation series is to determine what effect the candidate chemical has on seed germination.

If the compound exhibits sufficient biological activity, a portion of the seed (wheat and Douglas-fir) treated for the bioassay is reserved and the test initiated. One hundred treated seeds are planted in vermiculite and placed into a seed germinator. Seedling counts are made at periodic intervals and compared with an untreated control.

Foliar Phytotoxicity and Acceptance Tests (Repellents)

Potted plants of two species are employed in the phytotoxicity tests; l-year-old Douglas-fir seedlings with new foliage and l-week-old bean seedlings are used. Suspensions of the candidate chemicals are sprayed on two containers of each species (pots contain a minimum of two Douglas-fir or three beans) until the leaves are wetted to capacity. Following application the seedlings are held in the greenhouse for 2 weeks although phytotoxicity, when occurring, is usually apparent within 1 week.

The compounds are formulated as a 5 percent concentration in a 1 percent Carbopol or an acetone-water-emulsifier carrier. If the compound is phytotoxic at 5 percent, a second test is conducted at a 1 percent concentration.

^{1/}Journal of Industrial Hygiene and Toxicology, Vol. 25, No. 9, pp. 415-417.

Within a day of spraying one of the two treated and one untreated control pot of each plant species are offered to individually-caged domestic rabbits. At the end of the 24-hour test period visual estimates are made of the amount of treated and untreated plant material consumed.

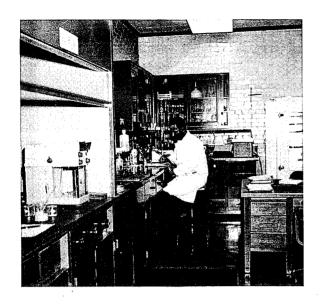
Phytotoxicity generally precludes further study of a compound as a foliar repellent. There will, however, be an occasional exception with compounds exhibiting a high degree of repellency. Attempts will be made to mask the phytotoxic effect of some of these highly active materials.

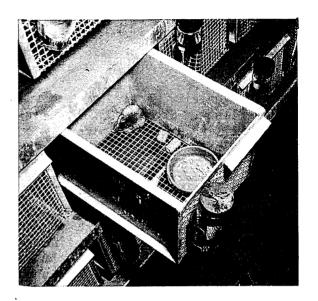
Concentration Test (Toxicants)

To evaluate acceptance of toxic compounds, the order of toxicity of the compounds must be considered. When two chemicals have the same toxicity and one is accepted, for example, five times better than the other, it is the preferred lethal agent, other factors being equal. Concentrations of chemical are prepared on wheat seed to produce a 4- to 6-seed lethal bait. This establishes a common denominator for comparing the degree of acceptance. Compounds that are not as well accepted as commercial rodenticides are rejected.

Douglas-fir Bioassay

One of the important problems of reforestation is protecting seed from wildlife. Forest managers need both toxicants for reductional control and chemical repellents that can be applied directly to the seed. A major obstacle is presented by the physical structure of tree seed; the edible portion is surrounded by an inedible hull. Rodents, by manipulating the seed, are able to cut through a chemically coated hull with a minimum contact with the chemical. Highly active repellents or toxicants which are not phytotoxic are potential candidates. These materials are coated on Douglas-fir seed at a l percent concentration. Fifty seeds are offered daily to five individually-caged Peromyscus for three consecutive days. Failure to protect Douglas-fir seed is not, taken alone, cause to reject the chemical.





Mammal evaluations at the Denver Center. Ieft: Iaboratory facilities for preparing seeds for bioassay studies. Right: Bioassay cage ready for test; it contains a Peromyscus m., sustaining ration, and a dish with 25 treated wheat seeds.





Plant evaluations at the Denver Center. Left: Seed phytotoxicity tests conducted in a controlled environment germinator. Right: Greenhouse studies of phytotoxicity tests utilizing foliar applications of candidate chemicals on bean and Douglas-fir seedlings.

Translocation Tests (Laboratory and Field Station)

Compounds that can be translocated into the seed or seedlings are of special interest. Only those chemicals known to be absorbed by plants or those in the advanced stages of development as repellents or toxicants are tested for translocation. In the laboratory tests the chemical is added to the growing media at concentrations determined by its properties. The plant material then is analyzed chemically or through bioassay. In the field station studies 25 nursery-planted Douglas-fir seedlings are treated by root spraying or by dusting the planting hole.

Field Station Pen Tests

The pen tests are one-animal tests of short duration. They are used to evaluate toxic compounds and to rapidly indicate the degree of repellency of candidate chemicals. In these tests the toxic compounds are offered on bait carriers or, if systemic, as treated seedlings. When testing repellents, the seedlings are treated by immersing the plants into a mixture of the chemical and an adhesive. The seedlings with the roots removed then are offered to the animals by stapling them to "exposure boards." Due to their erratic behavior, the pen tests with deer have not proven practical as a quick indicator for this species.

Field Station Enclosure Studies

The enclosure tests evaluate treatments under semi-field conditions. The analytical design permits up to 16 evaluations at one time. The design is the same for both deer and snowshoe hares, the only difference being in the size of the units; the hare enclosure is 2 acres in size whereas the deer enclosure is $2\frac{1}{2}$ acres. Two-year-old (2-0) Douglas-fir seedlings are the standard carrier for the candidate repellent chemicals. To insure uniform coverage the seedlings are treated by immersion into a mixture of the chemical and adhesive. Two concentrations, 3 and 6 percent, of the candidate repellents are employed. The treated seedlings then are transplanted into the enclosure and exposed to the animals until a predetermined number (approximately 80 percent) of the untreated control seedlings are cut; this serves as an indicator of feeding pressure. The experimental treatments are compared to a 6 percent TMTD and to untreated control seedlings in the snowshoe hare enclosures, and to a 6 percent TMTD, a 6 percent ZAC and untreated controls in the deer studies. To overcome individual behaviorisms a minimum of 10 animals is used for each test.

The test design consists of 10 randomly located plots (27' x 45'), each providing 160 tree locations spaced at 3-foot intervals. The tree locations are assigned at random within each plot for each of the 16 possible treatments. Therefore, each treatment is represented by 16 trees in each of the 10 plots. Frequency of cutting is recorded as negative (-) or affirmative (+), and the data are analyzed by arc-sin transformation and analysis of variance (F-test). If the F-test indicates significances among treatments, the data are then carried through Duncan's Multiple Range Test for a comparison among treatment means. Thus the multiple range test is used to indicate which treatments are as good or better than the standard.

Field Station Phytotoxicity Studies

An additional 25 seedlings are treated at each concentration at the time the seedlings are prepared for the enclosure studies. These seedlings are then transplanted into a nursery and held through one growing season, or until phytotoxicity is evident.

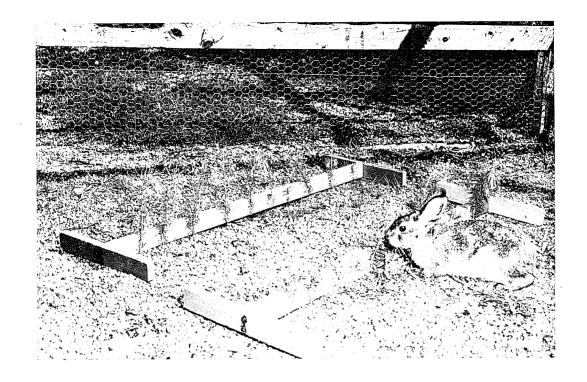
Field Evaluation

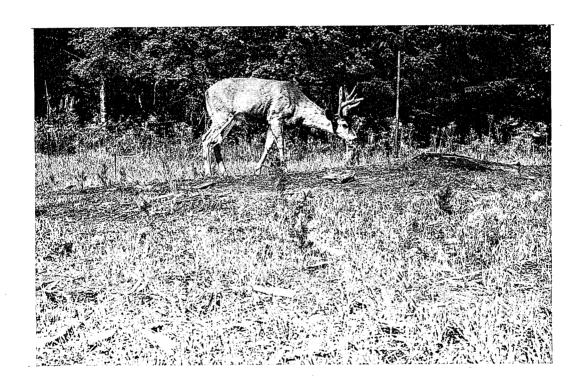
A series of plot designs is being evaluated cooperatively in the Pacific Northwest. From this study a standard procedure for evaluating repellent compounds will be adapted. The evaluation of toxic compounds will vary greatly with their intended use. All field testing will be done cooperatively with land managing agencies.





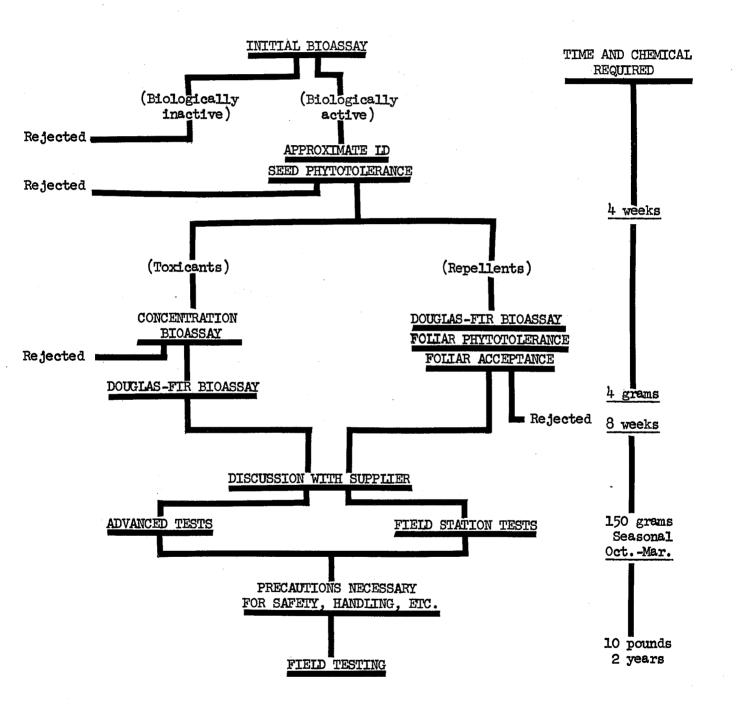
Advanced evaluations at field station. Left: Forest Research Center, Olympia, Washington (space provided by U. S. Forest Service). Right: Applying systemic compound to seedlings (nursery provided by Washington Department of Natural Resources).





Mammal evaluations at field station. Upper: Pen test in which seedlings tacked to exposure boards are offered to snowshoe hare. Lower: Enclosure study with seedlings planted at random within a grid.

STAGES IN EVALUATION AND DEVELOPMENT OF CHEMICALS FOR PREVENTION OF FOREST ANIMAL DAMAGE



STANDARDS

Compounds

Compounds, both commercial and experimental, recognized for their mammalian repellency or rodenticidal properties are being used as standards. These compounds previously were tested on two mammal species, laboratory white mice and native Peromyscus m.; the resulting data permit the investigator and the supplier to comparatively measure the relative effectiveness of candidate compounds. The following compounds were used as standards:

Repellents

TMTD--tetramethylthiuram disulfide ZAC--zinc dimethyldithiocarbamate cyclohexylamine complex Beta-Nitrostyrene TNB-A--trinitrobenzene-aniline

These four compounds are effective repellents for hares, rabbits, deer, and some other wild mammals. TMTD and ZAC are applied as foliar repellents by spraying seedlings with 5 to 10 percent concentrations. Beta-nitrostyrene, while highly repellent, is very phytotoxic as foliar or seed treatments. Varying degrees of phytotoxicity have been observed when TNB-A was applied as foliar treatments.

Lethal Agents

Endrin Compound 1080--monosodium fluoroacetate Strychnine Tetramine--tetramethylene disulfotetramine DRC-714

The first three compounds are currently available and are being used as rodenticides with varying degrees of success and associated hazards. The other two compounds are experimental toxicants.

In the field of forest animal damage control Endrin is primarily used as a seed treatment, whereas compound 1080 and strychnine are usually employed on baits. Secondary hazard properties of compound 1080 restrict its use as a rodenticide. Strychnine is poorly accepted by some animals, and others build up tolerances to the compound, thereby reducing its effectiveness. Tetramine is being tested both as a seed treatment and systemic toxicant. Compound DRC-714 is an unidentified, experimental rodenticide that is well accepted by some problem animal species.

Rating System

Toxicity and repellency are vague, qualitative terms. Frequently, highly toxic compounds are referred to as repellents. Toxic chemicals that are avoided, or consumed at sublethal levels, may produce a response similar

to that of "repellent" chemicals. Such poorly accepted toxic compounds, however, often are responsible for adverse side effects. Rather than attempt to define the two terms and categorize all active chemicals accordingly, a rating system has been developed and adapted that takes into consideration three important functions: (1) the lethal level of the compound; (2) acceptance in relation to the lethal dose; and (3) effect on or mortality of the test species. Each of these dimensions can be measured and assigned a value, thus permitting comparisons.

The AID is the basis of the rating system. Consumption calculated on first day's acceptance is expressed in amounts of an AID consumed. The effect is expressed in percent mortality of the test animals. To be considered a good candidate repellent, it is necessary that the compound have a low order of toxicity, be poorly accepted, and possess an adequate margin of safety. A compound with a rating of 1000-0.05-0 thus would be relatively non-toxic (1000 mg/kg), poorly accepted (0.05 of a lethal dose), and have no lethal effect on the test animals (0 percent mortality). Such a compound would be considered a promising repellent. A rating of 5-10-100 would indicate a highly toxic compound (5 mg/kg) that is well accepted (10 times a lethal dose) and extremely effective (100 percent mortality).

To comparatively evaluate the lethal agents it is necessary that a second bioassay be conducted at a concentration adjusted to the toxicity of the compound. For a true picture of acceptance it is reasoned that more than one seed should be required to produce a lethal dose. The number of seeds lethal for the acceptance test has been arbitrarily established at five, with a permitted range of not less than four or more than six seeds lethal.

It is not uncommon to have the test animals survive bioassays where they consume in excess of the calculated lethal dose. These discrepancies can generally be explained in one of two ways: (1) the compound is unstable or (2) it is degraded or excreted by the test animals at a rapid rate.

Concentration Tables

Concentration tables are included for the two animal species (laboratory white mice and native Peromyscus m.) employed in the tests of compounds used as standards. Weighted averages are used in the tables to aid in evaluations of bioassay test results. Values are expressed as the approximate number of treated wheat seeds required to produce a lethal reaction in relation to the ALD and concentration of the chemical employed. These tables may be used in two ways: (1) to determine the number of seeds that would be lethal at a given concentration when the ALD is known or (2) to estimate the ALD within broad limits from data obtained from the bioassay record.

Where required, slight modifications are made in the concentrations to produce the 4 to 6 seed lethal treatments described previously.

TABLE 1. APPROXIMATE NUMBER OF WHEAT SEED LETHAL TO 20 GRAM PEROMYSCUE AT GIVEN CONCENTRATIONS

	ri	0.02	0.04	0.08	0.16	0.41	0.81	٥•4	
	1.6	0.08 0.05 0.03 0.02	70.0	0.13 0.08	0.60 0.39 0.26 0.16	0.65 0.41	1.3	4. 9	
	2.4	0.05	0.15 0.10	0.30 0.20	0.39	1.0	2.0	9.6	
	3.7		0.15	0.30		1.5	3.0	15	
	5.5	0.11	0.22	0.45	0.0	2.2	4.5	22	
	80	91.0	0.33	0.65	1.3	3.3	6.5	83	
	12	0.25	0.49 0.33	0.98	2.0	4.9	9.8	148	
	1.8		0.73	1.5	2.9	7.3	1.5	72	
g/kg)	58	0.57 0.37	1.1	2.3	4.6	11	23	י פננ	
АРРКОХІМАТЕ LD (mg/kg)	75	98.0	1.7	3.4	6.9				
CIMAIL					•	17	34	168	
APPRO)	62	1.3	2.5	5.1	10	25	50	248	
,	1 6	1.9	3.8	7.7	15	99	92	376	
	140	2.9	5.7	11	23	2.4	114	260	
	210	4.3	8.6	17	帮	98	171	i	
	320	22 15 9.6 6.6 4.3	13	56	52	131	560	ı	
		9.6		38	175 116 77	192	1	Į.	
	71.0	15	53	23	911	ı	ı	1	
	1070	22	43	87 58 38	175	1	1	į	
	1,600	33	65 43 29 19	131	ı	ı	1	ı	
	Conc. 1600 1070 710 470	2.00%	1.00%	0.50%	0.25%	0.10%	0.05%	0.01%	

Approximate number of mg of chemical/kg of body weight on each kernel of wheat*

2.00% = 49.0 1.00% = 24.5 0.50% = 12.3 0.25% = 6.1 0.10% = 2.5 0.05% = 1.2 *Values are based upon the average weight of seed and 20 gram Peromyscus.

TABLE 2. APPROXIMATE NUMBER OF WHEAT SEED LETHAL TO 25 GRAM SWISS WHITE MICE AT GIVEN CONCENTRATIONS

	, F-I	0.03	0.05	0.10	0.20	0.51	1.0	5.0
	1.6	†0°C	0.08			0.82	1.6	8.0
	2.h 1.6	0.06 0.04 0.03	0.12	0.25 0.16	0.49 0.33	1.2	2.5	12
	3.7	60.0	0.19	0.38	92.0	1.9	3.8	19
	5.5	0.14	0.28	0.56	1.1	2.8	5.6	
	ထ	0.20	0.41	0.82	1.6	4.1	8.2	04
:	12	0.31	0.61	1.2	2.5	6.1	12	ч 09
	18	94.0	0.92	1.8	3.7	9.5	18 1	9 06
g/kg)	28	0.71	J.4	5.9	5.7	14	29	
LD (m		1.1		4.3	9.8	-	N	140
CMATE	142		2.1		ω 	21	£3	210
APPROXIMATE LD (mg/kg)	62	1.6	3.2	9.6 6.3	1.3	32	. 63	ı
А	₹6	2.4	4.8	9.6	19	748	96	ı
	140	3.6	7.1	14	29	12	143	ι
	210	5.4	Ħ	27	43	107	214	1
	Conc. 1600 1070 710 470 320 210	27 18 12 8.2 5.4	55 36 24 16	33	65	163	ı	1
	₄ 70	12	₽	109 72 48 33	218 145 96 65	240	1	ì
į	710	18	36	72	145	1	1	ı
	1070	27	55		218	1	1	ı
	1600	41	82	163	327	ı	t	1
	Conc.	2.00% 41	1.00% 82	0.50%	0.25%	0.10%	0.05%	0.01%

Approximate number of mg of chemical/kg of body weight on each kernel of wheat*

2.00% = 39.2 1.00% = 19.6 0.50% = 9.8 0.25% = 4.9 0.10% = 2.0 0.05% = 1.0 *Values are based upon the average weight of seed and 25 gram Swiss White Mice.

TEST NO	. Standa	ard 9						CONCENTRATION _	2% wt.
COMPAN	Y CODE	ZAC		DRC		DATE PREP	2/15/63	DATE TESTED	2/18/63
		•				CARRIER	Wheat	TEST ANIMAL	Peromyscus
ANIMAL	DAILY	ACCEPT	ANCE	OBSERVATION PERIOD	TOTAL	FORMULATION:			
NUMBER	1	2	3	14 DAYS	SEED	CHEMICAL	_ DISSOLVED	IN ACETONE AND APP	LIED TO SEED.
1	17%	3/1	8K		28	CHEMICAL	_ DISSOLVED	IN WATER AND APPLIE	ED TO SEED.
2	25	25	2510		75	x - OTHER	Applied d	irect	
3	2	0/3	0		2				
4	5	5	0		5	ACTION RECOM	MENDED:		
5	24/1	25K	25K		74	- COMPOUN TESTING.		ENTLY ACTIVE TO WAR	RANT FURTHER
TOTAL	73	53	58		1.84			Y TO WARRANT FURTI	HED TESTING
			PERCEN	IT REDUCTION	50.9			ED INACTIVE BECAUS	
	e No. Seed		Approximat		Approx. No.	Ш Сом	POUND IS A P	OORLY ACCEPTED TO	XICANT
Consum	ed First Day		LD mg/kg 1070		Seed Lethal 22			RGIN OF SAFETY BETW 'EL PRECLUDING USE	
	-			 _				DENTICIDE DOUBTFUL	DUE TO
COMMEN.	TS:	<u> 10,10 - 0</u>	. 66 - 0			<u></u>		CICITY OF COMPOUND	
					PIOA	SSAV. DECORD		*	
						SSAY RECORD			
TEST NO	o. Standa	ard 13			Deliver inte	are Research Center		CONCENTRATION _	0.5% wt.
			7	DRC		DATE BOED	0/35/60	DATE TESTED	
00////				DRC					
ANIMAL	DAIL	Y ACCEPT	ANCE	OBSERVATION PERIOD	TOTAL	FORMULATION:	wneac	TEST ANIMAL	reromyseus
NUMBER		2	3	4 DAYS	SEED		DISCOLVED	IN ACETONE AND APP	I ICD TO CCCD
1	25	25	25		75			IN WATER AND APPLIE	
2	25	25	25		75				ED 10 SEED.
3	24/1	25	25		74	x - OTHER	Аррттеа а	11600	
4	25	25	25		75	ACTION RECOM	JENDED.		
5	25	25	25		75			ENTLY ACTIVE TO WAR	DANT EUDTUCD
TOTAL	124	125	125		374	TESTING.	D 10 0011 1012		KART FORTHER
TOTAL		-1.6.		IT REDUCTION	0.3	- INSUFFICE	IENT ACTIVIT	Y TO WARRANT FURTH	HER TESTING
Avoras	je No. Seed							OORLY ACCEPTED TO	
	ed First Day	<u> </u>	Approximat LD mg/kg		Approx. No. Seed Lethal				
	24.8		1070		87	AND	LETHAL LEV	GIN OF SAFETY BETW EL PRECLUDING USE	AS REPELLENT.
COMMEN.	rs:				·			DENTICIDE DOUBTFUL	DUE TO
						отн	ER		
								-10-1	
INVESTIC	SATOR:						-		

TEST NO	Stands	rd 11						CONCENTRATION	2% wt
COMPANY	CODE	ZAC		DRC		DATE PREP. <u>2/</u> 3	15/63	DATE TESTED	2/18/63
				ODSEDVATION	-	CARRIER Whe	eat	TEST ANIMAL	Swiss white
ANIMAL	DAILY	ACCEPTA	NCE	OBSERVATION PERIOD	TOTAL	FORMULATION:			
NUMBER	1	2	3	4_DAYS	SEED	CHEMICAL D	SISSOLVED I	N ACETONE AND APP	LIED TO SEED.
ī	23/2	25	25		73	CHEMICAL D	DISSOLVED I	N WATER AND APPLIE	D TO SEED.
2	17/5	6			23	x - OTHER	Applied d	irect	
3	23/2	25	12/11		61				
4	10/15	15/10	16/9		41	ACTION RECOMME	NDED:		
5	25	25	25		75	- COMPOUND TESTING.	IS SUFFICIE	NTLY ACTIVE TO WAR	RANT FURTHER
TOTAL	98	96	79		273		NT ACTIVITY	TO WARRANT FURTH	IED TESTING
			PERCEN	T REDUCTION	22.0			ED INACTIVE BECAUSI	
	e No. Seed		Approximat		Approx. No.	COMPO	DUND IS A PO	OORLY ACCEPTED TO	XICANT
Consum	ed First Da	<u> </u>	LD mg/kg		Seed Lethal			GIN OF SAFETY BETWI	
1.9	.6		1070		27	_			
COMMEN.	TS:	1070 -	0.73 - 2	20				PENTICIDE DOUBTFUL ICITY OF COMPOUND	DUE TO
						OTHER	₹		
				····					
INVESTIC	SATOR:								
					BIOA	SAY RECORD			
					Denver Wild	ife Research Center			
TEST NO	. Stand	ard 15						CONCENTRATION _	0.5% wt.
COMPAN	Y CODE	ZAC		DRC		DATE PREP. 2	2/15/63	DATE TESTED	2/18/63
						CARRIERW	Meat	TEST ANIMAL	Swiss white
ANIMAL	DAIL	Y ACCEPTA	NCE	OBSERVATION PERIOD	TOTAL	FORMULATION:			
NUMBER	l	2	3	14 DAYS	SEED	- CHEMICAL I	DISSOLVED	N ACETONE AND APP	LIED TO SEED.
1	25	25	24/1		74	- CHEMICAL I	DISSOLVED	N WATER AND APPLIE	ED TO SEED.
2	20/5	25	24/1		69	x - OTHER A	applied di	rect	
3	25	25	24/1		74				
4	25	23/2	23/2		71	ACTION RECOMME	ENDED:		
5	22/3	25/1	18/7		65	COMPOUND	IS SUFFICIE	NTLY ACTIVE TO WAR	RANT FURTHER
TOTAL	117	123	113		353	TESTING.			
IOIAL	<u> </u>			IT REDUCTION	5.9	- INSUFFICIE OR COMPOU	NT ACTIVIT	Y TO WARRANT FURTI ED INACTIVE BECAUS	IER TESTING E:
Assaura	ge No. Seed		Approxima		Approx. No.	Г П – сомРо	OUND IS A P	OORLY ACCEPTED TO	XICANT
	ed First Do		LD mg/kg		Seed Lethal			GIN OF SAFETY BETW	
2	23.4		1070		109	AND L	ETHAL LEV	EL PRECLUDING USE	AS REPELLENT.
COMEN	TC.							DENTICIDE DOUBTFUL	. DUE TO
COMMEN								ICTT OF COMPOUND	
	•	· · · · · · · · · · · · · · · · · · ·				. <u> </u>			
	CATOR.					·			

TEST NO	Standar	<u>d 10</u>						CONCENTRATION _	2% wt.
COMPANY	CODE	ZAC		DRC		DATE PREP	2/15/63	DATE TESTED	2/18/63
						CARRIERDo	ouglas-fir	TEST ANIMAL	Peromyscus
ANIMAL	DAILY	ACCEPTA	NCE	OBSERVATION PERIOD	TOTAL	FORMULATION:			
NUMBER	1	2	3	4 DAYS	SEED	CHEMICA	L DISSOLVED I	N ACETONE AND APP	LIED TO SEED.
1	50	50	50		150	CHEMICA	L DISSOLVED I	N WATER AND APPLIE	ED TO SEED.
2	50	50	50		150	x - OTHER_	Applied	direct	
3	49	50	50		149	·			
4	50	50	50		150	ACTION RECOM	MENDED:		
5	50	50	50		150			NTLY ACTIVE TO WAR	RRANT FURTHER
TOTAL	249	250	250		749	TESTING.		V TO WARDANT ELIGIT	HED TESTING
			PERCEN	IT REDUCTION	0.1			Y TO WARRANT FURTI ED INACTIVE BECAUS	
Averag	e No. Seed	A	pproximat	e .	Approx. No.	COM	POUND IS A PO	OORLY ACCEPTED TO	XICANT
Consum	ed First Day		LD mg/kg		Seed Lethal			GIN OF SAFETY BETW EL PRECLUDING USE	
	49.8		1070					DENTICIDE DOUBTFUL	
OMMENT	'S:					RAT	HER LOW TOX	ICITY OF COMPOUND	
						∐ − ОТН	.ER	****	
						<u> </u>			
TEST NO	. Stand	ard 12						CONCENTRATION _	25 wt.
COMPAN	Y CODE	ZAC		DRC		DATE PREP	2/15/63	DATE TESTED _	2/25/63
				OBSERVATION		CARRIERI	Oouglas-fir	TEST ANIMAL _	Swiss whit
ANIMAL		/ ACCEPTA	T	PERIOD	TOTAL SEED	FORMULATION:			
NUMBER	1	2	3	14_DAYS	3550	CHEMICA	L DISSOLVED	IN ACETONE AND APP	PLIED TO SEED.
1	48/2	38/12	40/2		1.26	CHEMICA	L DISSOLVED	IN WATER AND APPLI	ED TO SEED.
2	. 43/3	50	42/8		1.35	x - OTHER_	Applied	direct	
3	39/11	43/5	47/3		129				
4	48/2	50	48/2		146	ACTION RECOM	MENDED:		
5	26/12	3/32	11/9		40	- COMPOU		ENTLY ACTIVE TO WA	RRANT FURTHE
TOTAL	50/1	184	188		576	_		V TO WARDANT FURT	UED TESTINO
			PERCE	NT REDUCTION	23.2	OR COMP	OUND IS PLAC	Y TO WARRANT FURT ED INACTIVE BECAUS	E:
	je No.Seed ed First Da		Approxima		Approx. No.		MPOUND IS A P	OORLY ACCEPTED TO	DXICANT
Consum	40.8	<u> </u>	LD mg/kg	<u> </u>	Seed Lethal			GIN OF SAFETY BETY 'EL PRECLUDING USE	
COMMEN	·							DENTICIDE DOUBTFU	L DUE TO
						_	168 LOW 10X		
						''' لي			
INVEST						· · · · · · · · · · · · · · · · · · ·			
1144 52110	MIUK:							**	

TOXICITY RECORD
Denver Wildlife Research Center

TOXICITY RECORD

CHEMICAL	AL ZAC		DRC		TEST MAMMAL Peromyscus	CHEMICAL	'L ZAC		DRC		TEST MAMMAL_Swiss whitemales	itemales
FORMUL	FORMULATION DATE_2/25/63		_TEST DATE2/25/63		OBSERVATION PERIOD 2 DAYS		FORMULATION DATE 2/25/63		_TEST DATE_ <u>2/25/63</u>		OBSERVATI ON PERIOD	2 DAYS
TYPE OF	TYPE OF ADMINISTRATION	ATION Oral	A	APPROXIMATE LD =	: LD = 1070 mg. /kg.	TYPE OF	TYPE OF ADMINISTRATION	TION Oral.	APP	APPROXIMATE LD =	.D = 1070 mg.	
FORMULATION:		40 mg. active ingredient/ml. HOH	ingredient/m	I. HOH		FORMUL	ATION: 40	FORMULATION: 40 mg. active ingredient/ml.	- 1	нон		
COMMENTS:	TS:					COMMENTS:	Zi.					
Anima No.	Sex and Weight	Dosage 入ormg∕kg	Actual Dosage (ml)	Time of Admin.	TIME OF DEATH	Animal No.	Sex and Weight	Dosage Normg/kg	Actual Dosage (ml)	Time of Admin.	TIME OF DEATH	
B3	M 25	1600	1.00	3:10	1st overnight period	A 13	М 19	1600	92.0	3:10	1st overnight period.	d.
4	F 20	1070	0.54		22 hours	17	M 27	1070	0.72		lst overnight period	ď
5	M 25	710	1小。			15	M 19	017)	₽.°0			
9	F 23	1470	0.27			91	M 23	0/1	0.27			
7	M 20	320	91.0			В	м 20	350	91.0		2nd overnight period	Ŋ
8	F 27	140	60.0		2nd overnight period	N	M 29	140	01.0			
!												
				-								
Method e Industria	nployed as de: Hygiene and	Method employed as described by Wm. Deichman and T. LeBlanc in the Journal of Industrial Hygiene and Toxicology, Vol. 25, No. 9, pp. 415-417.	ichman and T. Le 25, No. 9, pp. 415	Blanc in the J-417.	oumal of	Method e Industria	mployed as de I Hygiene and	scribed by Wm. De Toxicology, Vol.	Method employed as described by Wm. Deichman and T. LeBlanc in the Journal of Industrial Hygiene and Toxicology, Vol. 25, No. 9, pp. 415-417.	anc in the Jo 117.	urnal of	
			Investigator_			1			Investigator			
					GPO 835-723	23						GPO 835-723

SEED PHYTOTOXICITY RECORD

FOLIAR PHYTOTOXICITY AND FOLIAR ACCEPTANCE RECORD

Denver Wildlife Research Center	CHEMICAL ZAC DRC APPLICATION DATE 14/214/63	Application Method: K LEAVES SPRAYED UNTIL WELL WETTED. OTHER	Formulation: CHEMICAL SUSPENDED IN 1 PERCENT CARBOPOL SOLUTION.	CHEMICAL DISSOLVED IN ACETONE AND COMBINED WITH EMULSIFIER AND WATER.	х отнек нов	Comments: FOLIAR PHYTOTOXICITY	T Bean CONC: 5% NO. 2 PLANT Dougl	/1 82/1 92/1	TREATED 0 0 0 CONTROL 0 0 0		NO. 3 PLANT Been CONC: 1% NO. 4 PLANT DOUGLAS-FIT CONC: 1%	DATE 1/26 1/28 1/30 DATE 1/26 1/28 1/30	CONTROL 0 0 0 CONTROL 0 0 0	TREATED 0 0 0 TREATED 0 0 0	Legend (Injury): 0 = none; += slight; ++ = moderate; +++ = severe.	FOLIAR ACCEPTANCE	[X] TREATED SEEDLINGS OFFERED TO: DOMESTIC: RABBIT	SEEDLINGS CONSUMED WITHOUT APPARENT ILL EFFECTS – $\boxed{\mathbf{x}}$ $\boxed{\boxed{}}$ $\boxed{\mathbf{x}}$	SEEDLINGS NOT CONSUMED BY TEST ANIMAL 📋 🗷 📋	DEATH OF THE TEST ANIMAL []	COMMENTS: Estimated percent foliar consumption (treated/control). No. 1 = $87/100$ No. 2 = $20/100$ No. 3 = $72/90$ No. 4 = $12/20$	Investigator
	DATE PREPARED 2/15/63	ENTRATION 26 wts							TLOO/96	100/88												
Denver Wildlife Research Center		3 CHEMICAL CONCENTRATION Unstratified; Strati		CHEMICAL DISSOLVED IN ACETONE AND APPLIED TO SEED.	CHEMICAL SUSPENDED IN ADHESIVE AND APPLIED TO SEED. DIXECT		GERMINATION RESULTS			-		GROWTH RATE AND FORM		ABNORMAL FOLIAR DEVELOPMENT.	ABNORMAL ROOT DEVELOPMENT.	ABNORMAL FOLIAR COLORATION.	ARED NORMAL.				Investigator	
Denver Wildlif	BIOASSAY REFERENCE Stan. 9	.DATE PLANTED <u>2/20/63</u> IME OF TREATMENT:		LVED IN ACETONE A	INDED IN ADHESIVE		GERMIN	-	3/4	88	-	GROWTH RA		ABNORMAL FOLI	ABNORMAL ROOT	ABNORMAL FOLI	SEEDLING APPEARED NORMAL.				γi	
	ZAC	SEED <u>Wheat</u> DATE PLANTED <u>2</u> SEED CONDITION AT TIME OF TREATMENT:	Ä	CHEMICAL DISSOI	CHEMICAL SUSPEND OTHER Direct			-	96 tig	73 86	-		Pronounced				×	nts:				
	CHEMICAL_	SEED CONDIT	FORMULATION:] ,			CONTROL	TREATED			Slight					Comments:				

TEST NO	. Stand	ard 1						CONCENTRATION _	2% wt.
COMPAN	Y CODE	TMTD		DRC		DATE PREP	2/15/63	DATE TESTED	2/18/63
				T		CARRIER	Wheat	TEST ANIMAL	Peromyscus
ANIMAL	DAIL	ACCEPTA	NCE	OBSERVATION PERIOD	TOTAL	FORMULATION:			
NUMBER	ı	2	3	4_DAYS	SEED	CHEMICA	AL DISSOLVED	IN ACETONE AND APP	LIED TO SEED.
1	4	4	0		8	CHEMICA	L DISSOLVED	IN WATER AND APPLIE	D TO SEED.
2	19K	2			21	x - OTHER_	Applied di	rect	
3	8ĸ	4	1		13				
4	6	0	1.		7	ACTION REGOA	MENDED:		
5	6/1	0	0		6			ENTLY ACTIVE TO WAR	RANT FURTHER
TOTAL	43	10	2		55	TESTING			
			PERCEN	IT REDUCTION	84.3			'Y TO WARRANT FURTH ED INACTIVE BECAUS!	
	je No. Seed		Approximat	e ,	Approx. No.		MPOUND IS A P	OORLY ACCEPTED TO	KICANT
Consum	ed First Day	<u> </u>	LD mg/kg 1600	_	Seed Lethal			RGIN OF SAFETY BETWI	
COMMEN.					33	use	AS FIELD RO	DENTICIDE DOUBTFUL	
						_		TICH I OF COMPOUND	
INVESTIG	ATOR					<u>-</u>			· · · · · · · · · · · · · · · · · · ·
					BIOAS	SAY RECORD			
						ife Research Center			
TEST NO	. Standa	rd 5						CONCENTRATION	0.5% ++
COMPAN	Y CODE	TMTD		DRC		DATE PREP	2/15/63	DATE TESTED	
					· · · · · · · · · · · · · · · · · · ·			TEST ANIMAL	
ANIMAL	DAILY	ACCEPTA	NCE	OBSERVATION PERIOD	TOTAL	FORMULATION:	WIICE 0	IESI ANIMAL	Peromyscus
NUMBER	1	2	3	4 DAYS	SEED	•	I DISSOLVED	IN ACETONE AND APPI	
ī	20/1	5/1	8		33				
2	25	2	17		44			IN WATER AND APPLIE irect + 3 ml HOH	D TO SEED.
3	22	22	14/3		58	M - OTHER_	Аррттей и	TIEGG + 3 MI HOH	
4	. 25	14	3		42	ACTION RECOM	MENDED.		
- 5	25	25	25		75	_		NTI V ACTIVE TO WAR	- 4112 2112
TOTAL	117	<u>-</u> 27	67		252	TESTING	4D 13 30FFICIE	NTLY ACTIVE TO WAR	RANI FURTHER
				T REDUCTION	32.8	INSUFFIC OR COMP	TENT ACTIVIT	Y TO WARRANT FURTH ED INACTIVE BECAUSE	ER TESTING
	e` No. Seed		pproximat	e A	approx. No.			OORLY ACCEPTED TOX	
	ed First Day	<u> </u>	LD mg/kg	<u>_s</u>	eed Lethal	☐- INA	DEQUATE MAR	GIN OF SAFETY BETWE	EN AVOIDANCE
	23.4		1600		131	AND	LETHAL LEV	EL PRECLUDING USE A	S REPELLENT.
COMMENT	'S:					L1 - USE RAT	HER LOW TOX	PENTICIDE DOUBTFUL ICITY OF COMPOUND	DUE TO
						□- отн	ER		
							,		
NVESTIG.	A FUR:								

TEST NO). <u>Standar</u>	rd 3							CONCENTRATION _	2% wt.
COMPAN	Y CODE	TMTD		DRC		_ DATE P	REP	2/15/63	DATE TESTED	2/18/63
						CARRIE	R	Wheat	TEST ANIMAL	Swiss white
ANIMAL	DAILY	ACCEPTA	NCE	OBSERVATION PERIOD	TOTAL	FORMUL	ATION:			
NUMBER	1	2	3	14_DAYS	SEED	<u></u>	CHEMICAL	_ DISSOLVED I	N ACETONE AND APP	LIED TO SEED.
1	15/1	4/4	0		19	<u> </u>	HEMICAL	_ DISSOLVED I	N WATER AND APPLIE	D TO SEED.
2	10/15	0/5	0		10	x - 0	THER	Applied dir	ect	
3	2	0	0/3		2	_				
4	8/9	2/6	9/6		. 19	ACTION	RECOMA	MENDED:		
5	4/1	1/1	0/6		5			D IS SUFFICIE	NTLY ACTIVE TO WAR	RANT FURTHER
TOTAL	39	7	9		55		ESTING.			
			PERCEN	T REDUCTION	85.3				TO WARRANT FURTH D INACTIVE BECAUSE	
Averag	e No. Seed		pproximat	e	Approx. No.] – сомі	POUND IS A PO	ORLY ACCEPTED TO	XICANT
Consum	ed First Day	<u> </u>	LD mg/kg		Seed Lethal	- [SIN OF SAFETY BETWE	
7	.8		+1600		+41		AND	LETHAL LEVE	EL PRECLUDING USE A	AS REPELLENT.
COMMENT	rs: <u>16</u>	500 - 0.19	9 - 0			. L	USE - RATI	AS FIELD ROD HER LOW TOXI	ENTICIDE DOUBTFUL CITY OF COMPOUND	DUE TO
						. [] – отні	ER		
INVESTIG	ATOR:			· <u>-</u>						
TEST NO	Standa	rd 7			Denver Wild	life Research C	enter		CONCENTRATION _	0 5d -+
	Y CODE			DRC		DATE D	DED	0/15/62	DATE TESTED	
GOIIII AIN				DRC						
ANIMAL	DAILY	' ACCEPTA	NCE	OBSERVATION PERIOD	TOTAL	FORMUL		wneat	TEST ANIMAL	Swiss white
NUMBER	1	2	3	4 DAYS	SEED		•	DISCOLVED II	U ACETONE ANDIADR	150 ma a===
1	25	25	19/6	2	69	1			A ACETONE AND APP	
2	20/4	25	23/2		68				WATER AND APPLIE	D TO SEED.
3	25	22/3	16/9		63	<u> </u>	HER	Applied dir	ect +3 ml. HOH	
4	5/20	24/1	5K/9		34	ACTION	RECOMM	/ENDED		
- 5	25	24/1	19/6		68	_			77 V 1670/5 70 W 5	-
TOTAL	100	120	82		302		ESTING.	D 13 SUPPICIES	NTLY ACTIVE TO WAR	RANT FURTHER
TOTAL	100	120			19.5	□ - IN	NSUFFICI	ENT ACTIVITY	TO WARRANT FURTH	ER TESTING
				T REDUCTION	19.5		_		D INACTIVE BECAUSE	-
	e No. Seed ed First Day		approximat LD mg/kg		Approx. No. Seed Lethal	Ĺ	_		ORLY ACCEPTED TO	
2	0.0		+1600	_	+163	· L	AND - [_	LETHAL LEVE	IN OF SAFETY BETWEEL PRECLUDING USE A	EEN AVOIDANCE AS REPELLENT.
COMMENT	TS:								ENTICIDE DOUBTFUL CITY OF COMPOUND	DUE TO
] – отне	ER		
	····	*							· · · · · · · · · · · · · · · · · · ·	· · · · · · · ·
INVESTIG	ATOR:									

TEST NO	Standar	rd 2						CONCENTRATION _	2% wt.
COMPANY	CODE	TMTD		DRC		DATE PREP	2/15/63	DATE TESTED	2/18/63
				OBSERVATION!		CARRIER	Douglas-fir	TEST ANIMAL	Peromyscus
ANIMAL	DAILY	ACCEPTA	NCE	OBSERVATION PERIOD	TOTAL	FORMULATION:			
NUMBER	1	2	3	4_DAYS	SEED	CHEMICA	L DISSOLVED IN	ACETONE AND APPL	LIED TO SEED.
1	49/1	50	50		149	CHEMICA	L DISSOLVED IN	WATER AND APPLIE	D TO SEED.
2	50	50	49		149	x - OTHER_	Applied (direct +3 ml HOH	
3	15/1	21	42		78				· ···
4	49/1	50	50		149	ACTION RECO	MENDED:		
5	50	49/1	50		149			TLY ACTIVE TO WAR	RANT FURTHER
TOTAL	213	220	241		674	TESTING			
			PERCEN	T REDUCTION	10.1			TO WARRANT FURTH D INACTIVE BECAUSE	
Averag	e No. Seed	Δ.	pproximate	•	Approx. No.		MPOUND IS A PO	ORLY ACCEPTED TO	XICANT
Consume	ed First Day	<u>_</u> _	LD mg/kg		Seed Lethal			IN OF SAFETY BETWI	
COMMENT	42.6 's:		1.60	<u> </u>		USE	AS FIELD ROD	ENTICIDE DOUBTFUL CITY OF COMPOUND	
SOMMEN !	J					_		CITT OF COMPOSITO	
			•			ب			
TEST NO	. Standa	rd 4			Denver Wild	ife Research Center		CONCENTRATION _	2% wt.
COMPAN	Y CODE _	TMTD		DRC		DATE PREP	2/15/63	DATE TESTED	2/18/63
				T	,	CARRIER	Douglas-f	<u>'ir</u> Test Animal	Swiss white
ANIMAL	DAIL	Y ACCEPTA	NCE	OBSERVATION PERIOD	TOTAL	FORMULATION			
NUMBER	1	2	3	4_DAYS	SEED	CHEMIC	AL DISSOLVED I	N ACETONE AND APP	LIED TO SEED.
I	11/39	4/46	1.6/34		31	CHEMIC	AL DISSOLVED I	N WATER AND APPLIE	ED TO SEED.
2	27/22	10/40	36/14		73	X - OTHER	Applied	direct +3 ml HOH	
3	42/4	43/6	27/5		112	-			
4	27/22	18/17	35/13		80	ACTION RECO	MMENDED:		
5	32/17	34/5	4/19		70			NTLY ACTIVE TO WAR	RANT FURTHER
TOTAL	139	109	11.8		366	TESTING		(TO WARD AND GRADE	IED TESTINO
			PERCEN	IT REDUCTION	51.2			TO WARRANT FURTI INACTIVE BECAUS	
	je No. Seed ed First Da		Approximat LD mg/kg		Approx. No. Seed Lethal	_		OORLY ACCEPTED TO	
	27.8		+1600					GIN OF SAFETY BETW EL PRECLUDING USE	
COMMEN.	TS:			-				ENTICIDE DOUBTFUL	. DUE TO
						□ - от	HER		
						∐ − от	HER		

Investigator_

GPO 835-723

Investigator_

TOXICITY RECORD

Denver Wildlife Research Center

TOXICITY RECORD
Denver Wildlife Research Center

FORML	FORMULATION DATE2/2 TYPE OF ADMINISTRATION_	=	2/25/63_TEST DATE2/25/63_ION0re1APPROX	1 5	OBSERVATI ON PERIOD 2 DAYS ATE LD = 1600 mg. A.	FORMUL. TYPE OF	FORMULATION DATE 2/29 TYPE OF ADMINISTRATION	2/25/63 T	FORMULATION DATE 2/25/63 TEST DATE 2/25/63. TYPE OF ADMINISTRATION O'R.	1	71 ON PERIOD 2 +1600 mg.
FORM	F:ORMULATION:					FORMUL	FORMULATION:	os os	ingredient/m]	corn oll	
		40 mg. active ingredient/ml. corn oil	ingredient/ml	corn oil.							
COMMENTS	NTS:					COMMENTS:	Ţš				
Animal No.	al Sex and Weight	Dosage Nor mg/kg	Actual Dosage (ml)	Time of Admin.	TIME OF DEATH	Anima! No.	Sex and Weight	Dosage Nor mg/kg	Actual Dosage (ml)	Time of Admin.	TIME OF DEATH
A 7	M 24		96.0	3:00	2nd overnight period	A 1	rd M	1600	0.84		
ω	м 24	1070	19. 0			ઢ	챵	1070	0.64		
6	M 20	710	0.36			8	8	710	0.36		
임	F 21	01-14	0.25			4	8	1470	0.24		
Ħ	F 20	320	91.0			5	5 [†]	320	0.19		
감	× 8	210	o.12			9	떲	210	0.16		
ļ			•								
į											
ļ											
										,	
Method employed as described by Wm. Deichman and T. LeBlanc	amployed or a	Manhad and a second and the second a									

FOLIAR PHYTOTOXICITY AND FOLIAR ACCEPTANCE RECORD

SEED PHYTOTOXICITY RECORD

Denver Wildlife Research Center	Denver Wildlife Research Center
CHEMICAL TWID BIOASSAY REFERENCE Stan. 1 & 3 DATE PREPARED 2	2/15/63 CHEMICAL TREED DRC APPLICATION DATE 4/24/63
SEED Wheat DATE PLANTED 2/20/63 CHEMICAL CONCENTRATION SEED CONDITION AT TIME OF TREATMENT: Unstratified Stratified Stratified	Application Method: X LEAVES SPRAYED UNTIL WELL WETTED. OTHER OTHER
FORMULATION: CHEMICAL DISSOLVED IN ACETONE AND APPLIED TO SEED. CHEMICAL SUSPENDED IN ADHESIVE AND APPLIED TO SEED. TOTHER Direct	Formulation: CHEMICAL SUSPENDED IN 1 PERCENT CARBOPOL SOLUTION. CHEMICAL DISSOLVED IN ACETONE AND COMBINED WITH EMULSIFIER AND WATER. Comments:
	FOLIAR PHYTOTOXICITY
GERMINATION RESULTS	PLANT Bean CONC.5% NO. 2 PLANTDougla
DATE 2/25 2/28 3/4 PLANTED/GERMINATED	ATED CONTROL 0 0 0 CONTROL 0 0 0
CONTROL 94 96 96 100/96	O O O TREATED O O
TREATED 47 52 57 100/57	
GROWTH RATE AND FORM	NO. 3 PLANT Bean CONC: 1% NO. 4 PLANT Douglas-fit CONC: 1% DATE 4/26 4/28 4/28 4/30 DATE 4/26 4/28 4/30
Slight Pronounced	O O O O O O O O O O O O O O O O O O O
☐ ABNORMAL FOLIAR DEVELOPMENT.	0 0
☐ ABNORMAL ROOT DEVELOPMENT.	ury): 0 = none; + = slight; ++ = moderate; +++=
☐ ABNORMAL FOLIAR COLORATION.	POLIAR ACCEPTANCE
E SEEDLING APPEARED NORMAL.	x Treated Seedlings offered to: DOMESTIC RABBIT
Comments:	NO. 1 NO. 2 NO. 3 NO. 4 SEEDLINGS CONSUMED WITHOUT APPARENT ILL EFFECTS -
	SEEDLINGS NOT CONSUMED BY TEST ANIMAL X X X
	DEATH OF THE TEST ANIMAL []
Investigator	COMMENTS: Estimated percent foliar consumption (treated/control) No. 1 = $0/80$ No. 2 = $1/95$ No. 3 = $15/100$ No. 4 = $0/90$
	Investigator

TEST NO.	Standa	rd 17						CONCENTRATION _	2% wt.
COMPANY	CODE B	eta-nitro	styrene	DRC		DATE PREP	2/15/63	DATE TESTED	2/18/63
						CARRIER	Wheat	TEST ANIMAL	Peromyscus
ANIMAL	DAIL	Y ACCEPT	ANCE	OBSERVATION PERIOD	TOTAL	FORMULATION	ı		
NUMBER	1	2	3	4_DAYS	SEED	X - CHEMIC	AL DISSOLVED	IN ACETONE AND APP	LIED TO SEED.
1	0	0	0		0		AL DISSOLVED	IN WATER AND APPLIE	D TO SEED.
2	1.	0	0		ı				
3	0	1	0		1				
4	0	0	0		0	ACTION RECO	MMENDED:	····	
5	1	0	0		1	– сомрои	IND IS SUFFICII	ENTLY ACTIVE TO WAR	RANT FURTHER
TOTAL	2	1	0		3	TESTING			
			PERCE	NT REDUCTION	99.2			TY TO WARRANT FURTH SED INACTIVE BECAUSI	
Average	e No. Seed		Approxima	ite	Approx. No.		MPOUND IS A F	POORLY ACCEPTED TO	XICANT
Consume	o.4	<u> </u>	LD mg/k 710	g <u>:</u>	Seed Lethal			RGIN OF SAFETY BETWI	
COMMENT		0.03	·······	_				DENTICIDE DOUBTFUL	DUE TO
•						_			
11.11.	. =								
TEST NO.	Standar	rd 21						CONCENTRATION	0.5% wt.
COMPANY	CODE Bet	a-nitros	tyrene	DRC		DATE PREP	2/15/63	DATE TESTED	2/18/63
				longspy4 Figur	-	CARRIER	Wheat	TEST ANIMAL	Peromyscus
ANIMAL	DAILY	ACCEPTA	NCE	OBSERVATION PERIOD	TOTAL	FORMULATION:			
NUMBER	1	2	3	_4_DAYS	SEED	X - CHEMICA	L DISSOLVED	IN ACETONE AND APPL	IED TO SEED.
1	12/3	11K/2	25K		48	CHEMICA	AL DISSOLVED	IN WATER AND APPLIE	D TO SEED.
2	14	2	6		12	OTHER_			
3	1/4	0	0		1				
4	2/1	0	2K		14	ACTION RECOM	MENDED:		1
5	21/4	6	3		30			NTLY ACTIVE TO WAR	RANT FURTHER
TOTAL	40	19	36		95	TESTING			
			PERCE	T REDUCTION	74.7	OR COMP	OUND IS PLAC	Y TO WARRANT FURTH ED INACTIVE BECAUSE	ER TESTING :
-	No. Seed		Approxima		pprox. No.	co	MPOUND IS A P	OORLY ACCEPTED TOX	CICANT
	d First Day	<u> </u>	LD mg/kg 710	<u> </u>	eed Lethal 58	ANI – []	DEQUATE MAR	GIN OF SAFETY BETWE	EN AVOIDANCE S REPELLENT.
COMMENT		710 -	0.14 - 2	20		☐- USE RA	AS FIELD ROI THER LOW TOX	DENTICIDE DOUBTFUL	DUE TO
						□ - ОТ	HER		
NVESTIGA	ATOR:								

Beta-nitrostyrene

BIOASSAY RECORD

TEST NO.	Standa	ard 19						CONCENTRATION _	2% wt.
COMPANY	CODE B	eta-nitro	styrene	DRC		DATE PREP	2/15/63	DATE TESTED	2/18/63
						CARRIER	Wheat	TEST ANIMAL	Swiss white
ANIMAL	DAIL	Y ACCEPTA	NCE	OBSERVATION PERIOD	TOTAL	FORMULATION:			
NUMBER	ī	2 ~	3	4 DAYS	SEED	X - CHEMICA	L DISSOLVED	IN ACETONE AND APP	LIED TO SEED.
ı	1	0/2	1		2			IN WATER AND APPLIE	
2	0	0	0		0	_			-
3	0	0	0		0				
4	0	0/3	1/2		1	ACTION RECOM	MENDED:		
5	0	1	0		1.	_ COMPOU	ND IS SUFFICIE	ENTLY ACTIVE TO WAR	RANT FURTHER
TOTAL	1.	1	2		4	TESTING	•		
			PERCEN	IT REDUCTION	98.9			Y TO WARRANT FURTH CED INACTIVE BECAUS	
Average	No. Seed		pproximat	'e	Approx. No.		APOUND IS A P	POORLY ACCEPTED TO	XICANT
Consume	d First Day		LD mg/kg 710		Seed Lethal			RGIN OF SAFETY BETW	
COMMENT		710 - 0.0			. 10	USE	AS FIELD RO	DENTICIDE DOUBTFUL	
JOMMENT	s:	110 - 0.0.	0					(ICITY OF COMPOUND	
						□-016	1EK		
									· · · · · · · · · · · · · · · · · · ·
NVESTIGA	ATOR:	···			BIOAS	SAY RECORD			
	ATOR:				BIOAS	SAY RECORD ife Research Center		CONCENTRATION _	0.5% wt.
TEST NO.	Standa	rd 23		DRC	BIOAS Denver Wild	ife Research Center	2/15/63	CONCENTRATION _ DATE TESTED _	
TEST NO. COMPANY	Standa	rd 23		. DRC	BIOAS Denver Wild	ife Research Center DATE PREP.		_	2/18/63
TEST NO. COMPANY	Standa: CODE B	rd 23 eta-nitro Y ACCEPTA	styrene NCE		BIOAS Denver Wild	ife Research Center DATE PREP.		DATE TESTED	2/18/63
TEST NO. COMPANY ANIMAL NUMBER	Standa.	rd 23 eta-nitro	styrene	DRC	BIOAS	DATE PREP CARRIER FORMULATION:	Wheat	DATE TESTED	2/18/63 Swiss white
TEST NO. COMPANY ANIMAL NUMBER	Standa: CODE B	rd 23 eta-nitro Y ACCEPTA	styrene NCE	DRCOBSERVATION PERIOD	BIOAS Denver Wild	DATE PREP CARRIER FORMULATION:	Wheat	DATE TESTED TEST ANIMAL	2/18/63 Swiss white
TEST NO. COMPANY ANIMAL NUMBER 1 2	Standa: CODE B DAILY	rd 23 eta-nitro Y ACCEPTA	styrene NCE 3	DRCOBSERVATION PERIOD	BIOAS Denver Wild TOTAL SEED	DATE PREP CARRIER FORMULATION: X - CHEMICA	Wheat	DATE TESTED TEST ANIMAL IN ACETONE AND APP	2/18/63 Swiss white
TEST NO. COMPANY ANIMAL NUMBER 1 2 3	Standa: CODE B DAIL 1 2/1	rd 23 eta-nitro Y ACCEPTA 2	styrene NCE 3	DRCOBSERVATION PERIOD	BIOAS Denver Wild TOTAL SEED	DATE PREP CARRIER FORMULATION: X - CHEMICA	Wheat L DISSOLVED L DISSOLVED	DATE TESTED TEST ANIMAL IN ACETONE AND APP	2/18/63 Swiss white
TEST NO. COMPANY ANIMAL NUMBER 1 2 3 4	Standa: CODE B DAILY 1 2/1 2	rd 23 eta-nitro Y ACCEPTA 2 0 0/1	styrene NCE 3 0 0/2	DRCOBSERVATION PERIOD	BIOAS Denver Wild TOTAL SEED 2	DATE PREP CARRIER FORMULATION: X - CHEMICA	Wheat L DISSOLVED L DISSOLVED	DATE TESTED TEST ANIMAL IN ACETONE AND APP	2/18/63 Swiss white
TEST NO. COMPANY ANIMAL NUMBER 1 2 3	Standa: CODE B DAIL 1 2/1 2 0/2	rd 23 eta-nitro Y ACCEPTA 2 0 0/1 4/4	styrene NCE 3 0 0/2 16	DRCOBSERVATION PERIOD	BIOAS Denver Wild TOTAL SEED 2 2 20	DATE PREP CARRIER FORMULATION: X - CHEMICA	Wheat L DISSOLVED L DISSOLVED MENDED:	DATE TESTED TEST ANIMAL IN ACETONE AND APP	2/18/63 Swiss white LIED TO SEED.
TEST NO. COMPANY ANIMAL NUMBER 1 2 3 4	Standa: CODE _B DAILY 1 2/1 2 0/2 3	rd 23 eta-nitro Y ACCEPTA 2 0 0/1 4/4 0/4	styrene NCE 3 0 0/2 16 1	DRCOBSERVATION PERIOD	BIOAS Denver Wild TOTAL SEED 2 2 20 14	DATE PREP CARRIER FORMULATION: X - CHEMICA	Wheat L DISSOLVED L DISSOLVED MENDED:	DATE TESTED TEST ANIMAL IN ACETONE AND APPLIE IN WATER AND APPLIE ENTLY ACTIVE TO WAR	2/18/63 Swiss white LIED TO SEED. ED TO SEED.
TEST NO. COMPANY ANIMAL NUMBER 1 2 3 4 5	Standa CODE Br CODE Br CODE Br CODE Br CODE Br CODE Br CODE COD	rd 23 eta-nitro Y ACCEPTA 2 0 0/1 4/4 0/4 0/1	styrene NCE 3 0 0/2 16 1 3 20	DRCOBSERVATION PERIOD	BIOAS Denver Wild TOTAL SEED 2 2 20 4	DATE PREP CARRIER FORMULATION: X - CHEMICA - CHEMICA - OTHER_ ACTION RECOM TESTING. - INSUFFIC	Wheat L DISSOLVED L DISSOLVED MENDED: ND IS SUFFICIE	DATE TESTED TEST ANIMAL IN ACETONE AND APPLIE	2/18/63 Swiss white LIED TO SEED. ED TO SEED. ERANT FURTHER HER TESTING
TEST NO. COMPANY ANIMAL NUMBER 1 2 3 4 5 TOTAL	Standa: CODE B DAIL 1 2/1 2 0/2 3 1 8	rd 23 eta-nitro Y ACCEPTA 2 0 0/1 4/4 0/4 0/1 4	styrene NCE 3 0 0/2 16 1 3 20 PERCEN	DRCOBSERVATION PERIODDAYS	BIOAS Denver Wild TOTAL SEED 2 20 4 4 32 91.5 Approx. No.	DATE PREP CARRIER FORMULATION: x - CHEMICA	Wheat L DISSOLVED L DISSOLVED MENDED: ND IS SUFFICIE EIENT ACTIVIT OUND IS PLACE	DATE TESTED TEST ANIMAL IN ACETONE AND APPLIE IN WATER AND APPLIE ENTLY ACTIVE TO WAR	2/18/63 Swiss white LIED TO SEED. ED TO SEED. ERANT FURTHER HER TESTING
TEST NO. COMPANY ANIMAL NUMBER 1 2 3 4 5 TOTAL	Standa: CODE B DAILY 1 2/1 2 0/2 3 1 8 No. Seed d First Day	rd 23 eta-nitro Y ACCEPTA 2 0 0/1 4/4 0/4 0/1 4	styrene NCE 3 0 0/2 16 1 3 20 PERCEN	DRCOBSERVATION PERIODDAYS	BIOAS Denver Wild TOTAL SEED 2 20 4 4 32 91.5	DATE PREP CARRIER FORMULATION: X - CHEMICA	Wheat L DISSOLVED L DISSOLVED MENDED: ND IS SUFFICIE CIENT ACTIVIT OUND IS PLACE RPOUND IS A PROCEED AND THE PLACE REQUATE MAR	DATE TESTED TEST ANIMAL IN ACETONE AND APPLIE IN WATER AND APPLIE ENTLY ACTIVE TO WAR Y TO WARRANT FURTH ED INACTIVE BECAUSE	2/18/63 Swiss white LIED TO SEED. TO TO SEED. RANT FURTHER HER TESTING E: XICANT EEN AVOIDANCE
TEST NO. COMPANY ANIMAL NUMBER 1 2 3 4 5 TOTAL Average Consumed	Standa: CODE B DAILY 1 2/1 2 0/2 3 1 8 No. Seed d First Day	rd 23 eta-nitro Y ACCEPTA 2 0 0/1 4/4 0/4 0/1 4	Styrene NCE 3 0 0/2 16 1 3 20 PERCEN PPROXIMAT LD mg/kg 710	DRCOBSERVATION PERIODL DAYS	BIOAS Denver Wild TOTAL SEED 2 20 4 4 32 91.5 Approx. No. Seed Lethel	DATE PREP CARRIER FORMULATION: X - CHEMICA	Wheat L DISSOLVED L DISSOLVED MENDED: ID IS SUFFICIE CIENT ACTIVIT OUND IS PLAC APOUND IS A P DEQUATE MAR D LETHAL LEV AS FIELD ROI	DATE TESTED	2/18/63 Swiss white LIED TO SEED. CRANT FURTHER HER TESTING E: XICANT EEN AVOIDANCE AS REPELLENT.
TEST NO. COMPANY ANIMAL NUMBER 1 2 3 4 5 TOTAL Average Consumed	Standa: CODE B DAILY 1 2/1 2 0/2 3 1 8 No. Seed d First Day	rd 23 eta-nitro Y ACCEPTA 2 0 0/1 4/4 0/4 0/1 14	Styrene NCE 3 0 0/2 16 1 3 20 PERCEN PPROXIMAT LD mg/kg 710	DRCOBSERVATION PERIODL DAYS	BIOAS Denver Wild TOTAL SEED 2 20 4 4 32 91.5 Approx. No. Seed Lethel	DATE PREP CARRIER FORMULATION: X - CHEMICA	Wheat L DISSOLVED L DISSOLVED MENDED: ND IS SUFFICIE SIENT ACTIVIT OUND IS PLAC APOUND IS A P DEQUATE MAR LETHAL LEV AS FIELD ROI THER LOW TOX	DATE TESTED TEST ANIMAL IN ACETONE AND APPLIE ENTLY ACTIVE TO WAR Y TO WARRANT FURTH ED INACTIVE BECAUSE OORLY ACCEPTED TO: GIN OF SAFETY BETWI YEL PRECLUDING USE A DENTICIDE DOUBTFUL	2/18/63 Swiss white Swiss white LIED TO SEED. CRANT FURTHER HER TESTING EXICANT EEN AVOIDANCE AS REPELLENT. DUE TO

TEST NO	. Standar	rd 18						CONCENTRATION	2% wt.
COMPAN	Y CODE Be	ta-nitro	styrene	DRC		DATE PREP.	2/15/63	DATE TESTED	2/18/63
						CARRIER	Douglas-fir	TEST ANIMAL	Peromyscus
ANIMAL	DAILY	ACCEPTA	NCE	OBSERVATION PERIOD	TOTAL	FORMULATION			
NUMBER	1	2	3	<u>4</u> DAYS	SEED	× - CHEMIC	CAL DISSOLVED II	N ACETONE AND APP	LIED TO SEED.
I	49/1	50	50		149		CAL DISSOLVED II	N WATER AND APPLIE	ED TO SEED.
2	50	42	50		142	- OTHER			
3	50	48	149		147				
4	50	50	50		150	ACTION . RECO	DMMENDED:		
5	50	50	50		150			NTLY ACTIVE TO WAR	RRANT FURTHE
TOTAL	249	240	249		738	TESTIN			
			PERCEN	T REDUCTION	1.6			TO WARRANT FURTH D INACTIVE BECAUS	
Averag	e No. Seed		pproximate	2	Approx. No.	□-c	OMPOUND IS A PO	ORLY ACCEPTED TO	XICANT
Consume	ed First Day	<u> </u>	LD mg/kg		Seed Lethal	<u> </u>	ADEQUATE MAR	IN OF SAFETY BETW	EEN AVOIDANC
1	49.8		710					EL PRECLUDING USE	
COMMENT	rs:							ENTICIDE DOUBTFUL CITY OF COMPOUND	
						□ - o.	THER	• .	
						_			
						SSAY RECORD			
TEST NO). <u>Standa</u>	rd 20				SSAY RECORD life Research Center		CONCENTRATION _	25 wt.
			tyrene	DRC	Denver Wild	life Research Center	2/15/63	CONCENTRATIONDATE TESTED _	,
			tyrene		Denver Wild	life Research Center DATE PREP.		_	2/18/63
	Y CODE <u>Be</u>			DRCOBSERVATION PERIOD	Denver Wild	life Research Center DATE PREP.	Douglas-fir	DATE TESTED _	2/18/63
COMPAN	Y CODE <u>Be</u>	ta-nitros		OBSERVATION	Denver Wild	DATE PREP. CARRIER FORMULATION	Douglas-fir N:	DATE TESTED _	2/18/63 Swiss whi
COMPAN	Y CODE <u>Be</u>	ta-nitros	NCE	OBSERVATION PERIOD	Denver Wild	DATE PREP. CARRIER FORMULATIO	Douglas-fir N: CAL DJ\$SOLVED I	DATE TESTED _ TEST ANIMAL _	2/18/63 Swiss whi
COMPAN ANIMAL NUMBER	Y CODE Be	Y ACCEPTA	NCE 3	OBSERVATION PERIOD	Denver Wild	DATE PREP. CARRIER FORMULATIO	Douglas-fir N: CAL DISSOLVED I	DATE TESTED TEST ANIMAL _ N ACETONE AND APP	2/18/63 Swiss whi
ANIMAL NUMBER	Y CODE Be	Y ACCEPTA	3 10/l ₄	OBSERVATION PERIOD	TOTAL SEED	DATE PREP. CARRIER FORMULATION X - CHEMI	Douglas-fir N: CAL DISSOLVED I	DATE TESTED TEST ANIMAL _ N ACETONE AND APP	2/18/63 Swiss whi
ANIMAL NUMBER 1	Y CODE Be	Y ACCEPTA 2 3/7 4/10	3 10/4 7/8	OBSERVATION PERIOD _4_DAYS	TOTAL SEED	DATE PREP. CARRIER FORMULATION X - CHEMI	Douglas-fir N: CAL DISSOLVED I CAL DISSOLVED I	DATE TESTED TEST ANIMAL _ N ACETONE AND APP	2/18/63 Swiss whi
ANIMAL NUMBER 1	DAIL' 1 3/2 7/10 5/8	7 ACCEPTA 2 3/7 4/10 11/3	3 10/4 7/8 4/12	OBSERVATION PERIOD 14 DAYS	TOTAL SEED 16 18 20	DATE PREP. CARRIER FORMULATION - CHEMI - OTHER ACTION REC	Douglas-fir N: CAL DISSOLVED I R. OMMENDED:	DATE TESTED TEST ANIMAL _ N ACETONE AND APP	2/18/63 Swiss whi PLIED TO SEED.
ANIMAL NUMBER	7/10 5/8	7 ACCEPTA 2 3/7 4/10 11/3 8/7	3 10/4 7/8 4/12 12/10	OBSERVATION PERIOD 14 DAYS	TOTAL SEED 16 18 20 24	DATE PREP. CARRIER FORMULATION X - CHEMI - OTHER ACTION REC TESTIN	Douglas-fir N: CAL DISSOLVED I CAL DISSOLVED I COMMENDED: DUND IS SUFFICIE NG.	DATE TESTED TEST ANIMAL N ACETONE AND APPLI N WATER AND APPLI NTLY ACTIVE TO WAR	2/18/63 SWISS WhI PLIED TO SEED. ED TO SEED.
ANIMAL NUMBER	DAIL' I 3/2 7/10 5/8 4/14 6/8	7 ACCEPTA 2 3/7 4/10 11/3 8/7 7/4	3 10/4 7/8 4/12 12/10 11/10	OBSERVATION PERIOD 14 DAYS	TOTAL SEED 16 18 20 24 24	DATE PREP. CARRIER FORMULATION - CHEMI - OTHER ACTION REC - COMPO	Douglas-fir N: CAL DISSOLVED I	DATE TESTED TEST ANIMAL _ N ACETONE AND APP N WATER AND APPLI	2/18/63 Swiss whi PLIED TO SEED. ED TO SEED. RRANT FURTHE
ANIMAL NUMBER 1 2	DAIL' I 3/2 7/10 5/8 4/14 6/8 25	7 ACCEPTA 2 3/7 4/10 11/3 8/7 7/4 33	10/4 7/8 4/12 12/10 11/10 44 PERCEN	OBSERVATION PERIOD _4 _DAYS IT REDUCTION	TOTAL SEED 16 18 20 24 24 103 86.4 Approx. No.	DATE PREP. CARRIER FORMULATION TO CHEMI COMPO ACTION REC COMPO TESTIN I NSUFF OR COM	Douglas-fir N: CAL DISSOLVED I	DATE TESTED TEST ANIMAL _ N ACETONE AND APPLIE N WATER AND APPLIE NTLY ACTIVE TO WAR	2/18/63 Swiss whi PLIED TO SEED. ED TO SEED. RRANT FURTHE HER TESTING EE:
ANIMAL NUMBER 1 2	7 CODE Be DAIL' 1 3/2 7/10 5/8 4/14 6/8 25 ge No. Seed ed First Da	7 ACCEPTA 2 3/7 4/10 11/3 8/7 7/4 33	10/14 7/8 14/12 12/10 11/10 14 PERCEN	OBSERVATION PERIOD _4 _DAYS IT REDUCTION	TOTAL SEED 16 18 20 24 24 103 86.4	DATE PREP. CARRIER FORMULATION X - CHEMI - OTHER ACTION REC - COMPO TESTIN - INSUFF OR COI	Douglas-fir N: CAL DISSOLVED I	DATE TESTED TEST ANIMAL _ N ACETONE AND APPLIE NY ACTIVE TO WAI Y TO WARRANT FURT ED INACTIVE BECAUS DORLY ACCEPTED TO GIN OF SAFETY BETW	2/18/63 SWISS WHI PLIED TO SEED. ED TO SEED. RRANT FURTHE HER TESTING SE: DXICANT //EEN AVOIDANC
ANIMAL NUMBER 1 2	7 CODE Be DAIL' 1 3/2 7/10 5/8 4/14 6/8 25 ge No. Seed ed First Da 5.0	7 ACCEPTA 2 3/7 4/10 11/3 8/7 7/4 33	10/14 7/8 14/12 12/10 11/10 14 PERCEN Approximat LD mg/kg	OBSERVATION PERIOD 4 DAYS IT REDUCTION	TOTAL SEED 16 18 20 24 24 103 86.4 Approx. No. Seed Lethal	DATE PREP. CARRIER FORMULATION X - CHEMI - OTHER ACTION REC - COMPO TESTIN - INSUFF OR COI - C	Douglas-fir N: CAL DISSOLVED I	DATE TESTED	2/18/63 SWISS WhI PLIED TO SEED. ED TO SEED. RRANT FURTHE HER TESTING SE: DXICANT //EEN AVOIDANC AS REPELLENT
ANIMAL NUMBER 1 2	7 CODE Be DAIL' 1 3/2 7/10 5/8 4/14 6/8 25 ge No. Seed ed First Da 5.0	7 ACCEPTA 2 3/7 4/10 11/3 8/7 7/4 33	10/14 7/8 14/12 12/10 11/10 14 PERCEN Approximat LD mg/kg	OBSERVATION PERIOD _4 _DAYS IT REDUCTION	TOTAL SEED 16 18 20 24 24 103 86.4 Approx. No. Seed Lethal	DATE PREP. CARRIER FORMULATION TO CHEMIN COMPONITION REC COMPONITION COMPONIT	Douglas-fir N: CAL DISSOLVED I	DATE TESTED	2/18/63 SWISS Whi PLIED TO SEED. ED TO SEED. RRANT FURTHE HER TESTING E: DXICANT /EEN AVOIDANC AS REPELLENT DUE TO
ANIMAL NUMBER 1 2	7 CODE Be DAIL' 1 3/2 7/10 5/8 4/14 6/8 25 ge No. Seed ed First Da 5.0	7 ACCEPTA 2 3/7 4/10 11/3 8/7 7/4 33	10/14 7/8 14/12 12/10 11/10 14 PERCEN Approximat LD mg/kg	OBSERVATION PERIOD 4 DAYS IT REDUCTION	TOTAL SEED 16 18 20 24 24 103 86.4 Approx. No. Seed Lethal	DATE PREP. CARRIER FORMULATION TO CHEMIN COMPONITION REC COMPONITION COMPONIT	Douglas-fir N: CAL DISSOLVED I	DATE TESTED	2/18/63 SWIBS WhI PLIED TO SEED. ED TO SEED. RRANT FURTHE HER TESTING E: DXICANT /EEN AVOIDANC AS REPELLENT DUE TO

Beta-nitrostyrene

Denver Wildlife Research Center

TOXICITY RECORD

2 DAYS

1st overnight period

2 hours 2 hours

TIME OF DEATH

Time of Admin. 1:0

Actual Dosage (ml) 0.84 9.54 0.37 0.3I 0.17 0.10

Dosage Nor mg/kg 1600 1070 2 £1 8 140

Sex and Weight

ដ ଯ ৱ 8 ৱ 62

TOXICITY RECORD

Denver Wildlife Research Center

CHEMICAL Beta-nitrostyrene DRC TEST MAMMAL Feromyscus	CHEMICAL Beta-nitrostyrene DRC TEST MAMMAL Swiss whitemales
FORMULATION DATE 2/25/63 TEST DATE 2/26/63 OBSERVATION PERIOD 2 DAYS	FORMULATION DATE_2/25/63_TEST DATE_2/26/63_OBSERVATION PERIOD2_DAYS
TYPE OF ADMINISTRATION Oral APPROXIMATE LD = 710 mg. /kg.	TYPE OF ADMINISTRATION OTAL APPROXIMATE LD = 710 mg. /kg.
FORMULATION: 40 ml. active ingredient/ml. corn oil	FORMULATION:
	40 mg. active ingredient/ml. corn oil
COMMENTS:	COMMENTS:

Animal No.	g 29	S	턵	К	33	₩.						
_	T		1	Т			_	Т	 			
TIME OF DEATH	1st overnight period	1st overnight period	1st overnight period									
Time of Admin.	1:00											
Actual Dosage (ml)	0.84	6,45	0.37	0.25	0.18	0.09						
Dosage Nor mg/kg	1600	1070	710	014	330	140						
Sex and Weight	F 21	M 17	F 21	M 21	M 23	M 27					-	
Animal No.	c 35	36	37	.38	39	아						

Method employed as described by Wm. Deichman and T. LeBlanc in the Journal of Industrial Hygiene and Toxicology, Vol. 25, No. 9, pp. 415-417.

Method employed as described by Wm. Deichman and T. LeBlanc in the Journal of Industrial Hygiene and Toxicology, Vol. 25, No. 9, pp. 415-417.

GPO 835-723

SEED PHYTOTOXICITY RECORD

FOLIAR PHYTOTOXICITY AND FOLIAR ACCEPTANCE RECORD

Denver Wildlife Research Center

Denver Wildlife Research Center

CHEMICAL Beta-	-nitrostyre	√0 8 5 00	SSAY REFER	CHEMICAL <u>Beta-nitrostyren</u> giloassay references <u>tan. 17 &19</u> Date Prepared_	DATE PREPARED 2/15/63	CHEMICA	CHEMICAL Beta-nitrostyrene_DRC	APPLICATION DATE.	N DATE	4/24/63	63
SEED Wheat		_DATE PLANTED_		2/20/63CHEMICAL CO	CHEMICAL CONCENTRATION 26 wt.	Applicatio	Application Method:				
SEED CONDITION AT TIME OF TREATMENT:	I AT TIME OF	F TREA	TMENT:	Unstratified 2	X Stratified	×	[X] LEAVES SPRAYED UNTIL WELL WETTED.	OTHER			
FORMULATION:						Formulation:	lation: [x] CHEMICAL SUSPENDED IN 1 PEPCENT CADRADAL SOLUTION	NOITH IOS TOGORG			
X	EMICAL DISSC	OLVED	IN ACETONE	CHEMICAL DISSOLVED IN ACETONE AND APPLIED TO SEED.	ED.		CHEMICAL DISCOLUCION ACETONE AND COLDINED WITH EVILLE FIRST AND WITH	COMPINED WITH DM.	1 i	1	
₩ □	EMICAL SUSPI	ENDED	IN ADHESIVE	CHEMICAL SUSPENDED IN ADHESIVE AND APPLIED TO SEED.	EED.] [OTHER	COMBINED WITH EMUL	-SITIEK AI	€D WA! EK	
OTHER	-ter									,	
			,				FOLIAR PHYTOTOXICITY	TOTOXICITY			
			GERMIN	GERMINATION RESULTS		NO. 1	PLANT Bean CONC: 5%	-	PLANT Douglas-fir CONC:	s-firco	Ç: 5%
					-	DATE	08/4 86/4 96/4		8c/11 9c/11	11/30	
DATE 2/25	25 2/28		3/4		PLANTED/GERMINATED	CALNOL	0	2		3 0	
CONTROL	96 		96		96/001	TOTATE	, ;	:	, ;	, :	
TREATED	0		0		100/0	GREGIE		I KEA I ED ++	#	‡	-
						NO. 3	PLANT Bean CONC: 1%	NO. 4 PLAN	PLANT Douglas-firCONC:	s-firco	AC: 1%
			GROWTH R.	GROWTH RATE AND FORM		DATE	4/26 4/28 4/30	DATE 4/26	14/26 4/28 4/30	1/30	
Slight	Pronounced					CONTROL	0 0	CONTROL	0	0	
		ABI	NORMAL FOL	ABNORMAL FOLIAR DEVELOPMENT.		TREATED	‡		#	1	<u> </u>
		ABI	NORMAL ROC	ABNORMAL ROOT DEVELOPMENT.	-	Legend (Ir	ury): O = nane;	<u>}</u>			
		ABI	NORMAL FOL	ABNORMAL FOLIAR COLORATION.			FOLIAR ACCEPTANCE	CEPTANCE			
L	_	SEE	EDLING APPE	SEEDLING APPEARED NORMAL.		X	$\overline{\mathbf{x}}$ TREATED SEEDLINGS OFFERED TO: DOMESTIC RABBIT	TIC RABBIT			
Comments:_					٠	SE	SEEDLINGS CONSUMED WITHOUT APPARENT ILL EFFECTS -	NO. 1	No.2	δ. κ	ỗ.□
						SEI	SEEDLINGS NOT CONSUMED BY TEST ANIMAL	×	×		×
						DE	DEATH OF THE TEST ANIMAL				
			Ē	Investigator		COMMENT	COMMENTS. Estimated percent foliar consumption (treated/control) No. 1 = $0/100$ No. 2 = $0/60$ No. 3 = $100/100$ No. 4 = $20/70$	uption (treated/co No. 3 = 100/100	No. 4	= 20/70	
							investigator	igator			

Beta-nitrostyrene

TNB-A

BIOASSAY RECORD

TEST NO	. Standa:	rd 57						CONCENTRATION	2% wt.
COMPAN'	Y CODE	TNB-	·A -	DRC		. DATE PREP	5/3/63	DATE TESTED	5/6/63
					·	CARRIER	Wheat	TEST ANIMAL	Peromyscus
ANIMAL	DAIL	Y ACCEPT	ANCE	OBSERVATION PERIOD	TOTAL	FORMULATION	l:		
NUMBER	1	2	3	4_DAYS	SEED	X - CHEMIC	CAL DISSOLVED	IN ACETONE AND APPI	LIED TO SEED.
1	1	ı	3		5		CAL DISSOLVED	IN WATER AND APPLIE	D TO SEED.
2	OI	2	1		5	- OTHER	plyac adhe	sive used	
3	2	0	1		3				
4	3	0	0/2		. 3	ACTION RECO	DMMENDED:		
5	3	3	2		8	сомроі	UND IS SUFFICII	ENTLY ACTIVE TO WAR	RANT FURTHER
TOTAL	11.	6	7		5/1	TESTIN			
			PERCEN	NT REDUCTION	93.6			TY TO WARRANT FURTH CED INACTIVE BECAUSE	
Averag	e No. Seed		Approxima	te	Approx. No.	co	OMPOUND IS A F	OORLY ACCEPTED TO	KICANT
Consum	ed First Da	<u>y</u> _	LD mg/kg		Seed Lethal			RGIN OF SAFETY BETWI	
-	2.2		1070	<u></u>	22			DENTICIDE DOUBTFUL	
COMMENT	rs: <u>10</u>	<u>70 - 0.10</u>	0 - 0	·				CICITY OF COMPOUND	
						o1	THER		
						_			
NVESTIG	ATOR:								
TEST NO	. <u>Standa</u>	rd 59						CONCENTRATION _	0.5% wt.
COMPAN'	Y CODE _	TNB-A		DRC		DATE PREP	5/3/63	DATE TESTED	5/6/63
				T		CARRIER	Wheat	TEST ANIMAL	Peronyseus
ANIMAL	DAIL	Y ACCEPT	ANCE	OBSERVATION PERIOD	TOTAL	FORMULATION	l:		
NUMBER	ì	2	3	4_DAYS	SEED	E - CHEMIC	CAL DISSOLVED	IN ACETONE AND APP	LIED TO SEED.
1	6/2	3	3		12	CHEMIC	CAL DISSOLVED	IN WATER AND APPLIE	D TO SEED.
2	0	0	1/1		1	- OTHER			
3	5	3	0		8				
4	2	1	3		6	ACTION RECO	DMMENDED:		
5	. 6	2	5		13			ENTLY ACTIVE TO WAR	RANT FURTHER
TOTAL	19	9	12		40	TESTIN			
			PERCEN	NT REDUCTION	89.3	OR COM	ICIENT ACTIVIT	TY TO WARRANT FURTH SED INACTIVE BECAUSE	ER TESTING :
	e No. Seed		Approximat		Approx. No.	co	OMPOUND IS A F	OORLY ACCEPTED TO	CICANT
	ed First Da	<u>y</u> _	LD mg/kg 1070	<u>.</u>	Seed Lethal 87			RGIN OF SAFETY BETWE /EL PRECLUDING USE A	
	rs: <u>107</u>	0 - 0.04			-			DENTICIDE DOUBTFUL	DUE TO
						oī	THER		
			·						
NVESTIG	ATOR:								

TEST NO	. Standar	rd 58						CONCENTRATION _	2% wt.
COMPAN	Y CODE	TNB-A		DRC		DATE PREP.	5/3/63	DATE TESTED	5/13/63
				lenemny, mieri		CARRIER	Wheat	TEST ANIMAL	Swiss white
ANIMAL	DAILY	ACCEPTA	NCE	OBSERVATION PERIOD	TOTAL	FORMULATION:			
NUMBER	1	2	3	4_DAYS	SEED	x - CHEMICAL	DISSOLVED II	N ACETONE AND APPL	JED TO SEED.
1	1	0/12	0		1.	CHEMICAL	DISSOLVED II	N WATER AND APPLIE	D TO SEED.
2	5/3	8/2	1/4		14	OTHER	Adhesive p	lyac used	
3	2/6	1/2	14		7	· · · · · · · · · · · · · · · · · · ·			
4	5				5	ACTION RECOMME	ENDED:	•	
5	2	0	7		9		IS SUFFICIE	NTLY ACTIVE TO WAR	RANT FURTHER
TOTAL	15	9	12		36	TESTING.			
			PERCEN	T REDUCTION	88.0			TO WARRANT FURTH ID INACTIVE BECAUSE	
	e No. Seed		pproximate		Approx. No.		OUND IS A PO	ORLY ACCEPTED TO	(ICANT
Consum	ed First Day	<u> </u>	LD mg/kg 710		ieed Lethal	INADE	QUATE MARC	SIN OF SAFETY BETWEEL PRECLUDING USE A	EN AVOIDANCE
•					. 10	·		ENTICIDE DOUBTFUL	
COMMEN	rs:7	10 - 0.17	7 40			·		CITY OF COMPOUND	
						отне	·		
								• • • • • • • • • • • • • • • • • • • •	
INVESTIC	ATOR:								
				•		•			
					BIOA	SAY RECORD			
					Denvér Wild	ife Research Center			
TEST NO). Standa:	rd 60						CONCENTRATION _	
COMPAN	Y CODE	TNB-A		DRC		DATE PREP. 5/	3/63	DATE TESTED	5/13/63
[Γ			OBSERVATION		CARRIER Whe	eat	TEST ANIMAL	Swiss white
ANIMAL		ACCEPTA	<u> </u>	PERIOD	TOTAL SEED	FORMULATION:			
NUMBER	I	2	3	14_DAYS	3515	x - CHEMICAL	DISSOLVED I	N ACETONE AND APP	LIED TO SEED.
1	0/5	8/2	23/2		31	CHEMICAL	DI\$SOLVED I	N WATER AND APPLIE	D TO SEED.
2	1	0	0		1	OTHER			
3	3/1	0	2		5				
4	0	0/1	0/1		0	ACTION RECOMM	ENDED:		
5	7	16	15		38	- COMPOUND	IS SUFFICIĘ	NTLY ACTIVE TO WAR	RANT FURTHER
TOTAL	11	5/1	40		75		NT ACTIVITY	Y TO WARRANT FURTH	IED TESTING
			PERCEN	IT REDUCTION	80.0	OR COMPOL	JND IS PLACI	ED INACTIVE BECAUSE	E:
	ge No. Seed red First Da		Approximat LD mg/kg		Approx. No. Seed Lethal	COMP	OUND IS A PO	OORLY ACCEPTED TO	XICANT
	2.2	<u> </u>	710	<u> </u>	72			GIN OF SAFETY BETWI EL PRECLUDING USE A	
COMMEN	TS:	710 - 0 0						ENTICIDE DOUBTFUL	DUE TO
COMMEN	13:	120 - 0.0	_ ٥ - ر			<u></u>		ICITY OF COMPOUND	
			· · · · · ·			□ - olur			
						•			

TEST NO	Standar	rd 54				,		CONCENTRATION _	2% wt.
COMPAN	CODE	TNB-A		DRC		DATE PREP	5/3/63	DATE TESTED	5/6/63
 ,						CARRIER	Douglas-fir	TEST ANIMAL	Peromyscus
ANIMAL	DAILY	ACCEPTA	NCE	OBSERVATION PERIOD	TOTAL	FORMULATION			
NUMBER	Į.	2	3	4DAYS	SEED	⊠ - CHEMIC	CAL DISSOLVED I	N ACETONE AND APP	LIED TO SEED.
ī	50	50	50		150	☐ - CHEMIC	CAL DISSOLVED !	N WATER AND APPLIE	D TO SEED.
2	50	50	1,1		11:1	_			
3	50	50	50		150				
4	50	50	50		150	ACTION RECO	DMMENDED:		
5	50	50	50		150	П – сомро	UND IS SUFFICIE	NTLY ACTIVE TO WAR	RANT FURTHE
TOTAL	250	250	241		741	TESTIN			
	· · ·		PERCEN	T REDUCTION	1.2			Y TO WARRANT FURTH ED INACTIVE BECAUS	
Averga	e No. Seed		pproximate		Approx. No.	∏- c	OMPOUND IS A PO	OORLY ACCEPTED TO	XICANT
	ed First Day		LD mg/kg		eed Lethal			GIN OF SAFETY BETW	
_	50.0		1070					EL PRECLUDING USE	
OMMENT	S:							ENTICIDE DOUBTFUL	DUE TO
						- С			
			·····		"	_			
TEST NO	. Standa	rd 53						CONCENTRATION _	
COMPAN	Y CODE _	TNB-A		DRC		DATE PREP.	5/3/63	DATE TESTED _	5/13/63
				OBSERVATION		CARRIER	Douglas-fi	TEST ANIMAL	Swiss whit
ANIMAL		Y ACCEPTA	[PERIOD	TOTAL SEED	FORMULATIO	N:		
NUMBER	1	2	3	4 DAYS	JELD	× - CHEMI	CAL DISSOLVED	IN ACETONE AND APP	LIED TO SEED.
1	25	15	6/14	1	46	- CHEMI	CAL DISSOLVED	IN WATER AND APPLI	ED TO SEED.
2	13/6	50	25/21		88	OTHER	R		·
3	24/10	12/30	28/18	3	64				
4	8	10/15	21/10		39	ACTION REC	OMMENDED:		
5	35/15	8/20	7/18	3	50			NTLY ACTIVE TO WAR	RRANT FURTHE
TOTAL	105	95	87		287	TESTIN			
			PERCEN	IT REDUCTION	61.7	OR COM	MPOUND IS PLAC	Y TO WARRANT FURT ED INACTIVE BECAUS	HER TESTING E:
	e No. Seed		Approximat		Approx. No.	<u></u> - c	OMPOUND IS A P	OORLY ACCEPTED TO	XICANT
Consum	ed First Da	<u>y</u> _	LD mg/kg	<u> </u>	Seed Lethal			GIN OF SAFETY BETW	
21	•0		710					EL PRECLUDING USE	
COMMEN.	TS:						SE AS FIELD ROD ATHER LOW TOX	DENTICIDE DOUBTFUL ICITY OF COMPOUND	DUE TO
				· · · · · · · · · · · · · · · · · · ·					
NVESTIC	SATOR:					_			

GPO 835-723

Investigator_

TOXICITY RECORD

Denver Wildlife Research Center

TOXICITY RECORD
Denver Wildlife Research Center

FOR	WIJL AT	TON DATE	FORMULATION DATE 5/10/63	TEST DATE 5/	5/13/63 OBS	OBSERVATION PERIOD	3	FORMUL	ATION DATE	FORMULATION DATE 5/10/63	TEST DATE 5/13/63		OBSERVATION BEBIOD	A CEDIA MOLEDIA CONTRACTOR
-		1		21.02.12		NI ON FEMIOR							I ON PERIOD	2 DAY
Ĕ	E OF A	TYPE OF ADMINISTRATION_	ATION Oral		APPROXIMATE LD =	LD = 1070 mg.	_/kg.	TYPE OF	TYPE OF ADMINISTRATION_	ATION Oral		APPROXIMATE LD =_		71.0 mg. /kg.
Ę	MULAT	ION: Str	spension of 4	FORMULATION: Suspension of 40 mg. chemical per ml. corn	l per ml. c	orn ofl		FORMUL	ATION: Su	FORMULATION: Suspension of 40 mg.	O mg. chemica	chemical per ml. corn oil	orn oil	
										,				
Ó	COMMENTS							COMMENTS:	TS:			-		
•								İ						
₹_	Animal No.	Sex and Weight	Dosage Nor mg/kg	Actual Dosage (m1)	Time of Admin.	TIME OF DEATH	,	Anima No.	Sex and Weight	Dosage Normg/kg	Actual Dosage (ml)	Time of Admin.	TIME OF DEATH	
	В	F 17	1600	0.68	5/13/63	2nd overnight period		91 g	M 23	1600	0,92	5/13/63	Within 2 hours	
	Q	82	710	0.36				ر 1	M 26	710	0.48		Within 2 hours	
	ю	F 1.8	320	0.14		,		a	M 27	350	0.22			
-													.* -	
	A 2	¥ 22	1070	0.59	5/15/63 7:50	1st overnight period		c 10	M 27	470	0.32			
													-	
														-
ĺ														
ļ							,							
- 1														
	\dashv											•		
	\dashv													
Method employed as described by Wm. Deichman and T. LeBlanc	od emp	laund or do	Market and the state of the sta											

FOLIAR PHYTOTOXICITY AND FOLIAR ACCEPTANCE RECORD

SEED PHYTOTOXICITY RECORD

Denver Wildlife Research Center	Denver Wildlife Research Center
CHEMICAL TWB-A BIOASSAY REFERENCE Stan. 57858 DATE PREPARED 5/3/63	CHEMICAL TWB-A DRC APPLICATION DATE 6/15/63
SEED_WheatDATE PLANTED_5/10/63CHEMICAL CONCENTRATION_26 vt. SEED CONDITION AT TIME OF TREATMENT: Unstratified, Stratified	Application Method: [X] LEAVES SPRAYED UNTIL WELL WETTED. OTHER
FORMULATION: CHEMICAL DISSOLVED IN ACETONE AND APPLIED TO SEED. CHEMICAL SUSPENDED IN ADHESIVE AND APPLIED TO SEED. OTHER	Formulation: CHEMICAL SUSPENDED IN I PERCENT CARBOPOL SOLUTION. X CHEMICAL DISSOLVED IN ACETONE AND COMBINED WITH EMULSIFIER AND WATER. Comments:
	FOLIAR PHYTOTOXICITY
GERMINATION RESULTS	PLANT Bean CONC. 5% NO. 2 PLANT Douglas-fir CONC.
DATE 5/15 5/20 5/23 PLANTED/GERMINATED CONTROL 94 96 96 100/96	0 0 0 0 CONTROL 0 0 0 0 0 CONTROL 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
TREATED 0 0 0 100/0	INCALED INCALED
GROWTH RATE AND FORM	NO. 3 PLANT Bean CONC: 14 NO. 4 PLANT Douglas-fit CONC: 15 DATE 6/26 6/28 7/1 7/5
Slight Pronounced	CONTROL 0 0 0 0 CONTROL 0 0 0 0
BNORMAL FOLIAR DEVELOPMENT. ABNORMAL ROOT DEVELOPMENT.	0 <+ ++** +++**
ABNORMAL FOLIAR COLORATION.	FOLIAR ACCEPTANCE
SEEDLING APPEARED NORMAL.	X TREATED SEEDLINGS OFFERED TO: DOMESTIC RABBIT
Comments:	SEEDLINGS CONSUMED WITHOUT APPARENT ILL EFFECTS - \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
	SEEDLINGS NOT CONSUMED BY TEST ANIMAL 🕱 🖺
	DEATH OF THE TEST ANIMAL
Investigator	COMMENTS. #Old leaves only. Plant No. 125% treated consumed; 100% control consumed. Plant No. 250% treated consumed; 100% control consumed. **Old leaves only. New growth not affected.

	CONCENTRATION1% wt
COMPANY CODE DRC	DATE PREP. <u>2/15/63</u> DATE TESTED <u>2/18/63</u>
- Indiana in the second	CARRIER Wheat TEST ANIMAL Peromyscus
ANIMAL DAILY ACCEPTANCE OBSERVATION PERIOD TOTAL	FORMULATION:
NUMBER 1 2 3DAYS SEED	x - CHEMICAL DISSOLVED IN ACETONE AND APPLIED TO SEED.
1 1	CHEMICAL DISSOLVED IN WATER AND APPLIED TO SEED.
2 2/1 2	OTHER
3 2 2	
4 1	ACTION RECOMMENDED:
5 1, 1,	COMPOUND IS SUFFICIENTLY ACTIVE TO WARRANT FURTHER
TOTAL 10 10	TESTING.
PERCENT REDUCTION 92.0	 Insufficient activity to warrant further testing or compound is placed inactive because:
Average No. Seed Approximate Approx. No.	COMPOUND IS A POORLY ACCEPTED TOXICANT
Consumed First Day LD mg/kg Seed Lethal	- INADEQUATE MARGIN OF SAFETY BETWEEN AVOIDANCE
2.0 12 0.49	AND LETHAL LEVEL PRECLUDING USE AS REPELLENT.
COMMENTS: 12 - 4.1 - 100	I - USE AS FIELD RODENTICIDE DOUBTFUL DUE TO RATHER LOW TOXICITY OF COMPOUND
	OTHER
INVESTIGATOR:	
BIOASSA	AY RECORD
Denver Wildlife	e Research Center
TEST NO. Standard 41	CONCENTRATION1% wt.
COMPANY CODE Endrin DRC	DATE PREP. 4/19/63 DATE TESTED 4/22/63
	CARRIER Wheat TEST ANIMAL Peromyscus
ANIMAL DAILY ACCEPTANCE OBSERVATION PERIOD TOTAL	FORMULATION:
NUMBER 1 2 3 3 DAYS SEED	x - CHEMICAL DISSOLVED IN ACETONE AND APPLIED TO SEED.
1 5/5 5	— — — — — — — — — — — — — — — — — — —
2 3	- CHEMICAL DISSOLVED IN WATER AND APPLIED TO SEED.
3 5 5	- OTHER
3 5 5	ACTION RECOMMENDED: — COMPOUND IS SUFFICIENTLY ACTIVE TO WARRANT FURTHER
3 5 5 5 4 9 9 5 1 ₄ 4	ACTION RECOMMENDED: — COMPOUND IS SUFFICIENTLY ACTIVE TO WARRANT FURTHER TESTING.
3 5 5 5 4 9 9 5 14 TOTAL 26 26	ACTION RECOMMENDED: — COMPOUND IS SUFFICIENTLY ACTIVE TO WARRANT FURTHER
3 5 5 5 4 9 9 5 4 TOTAL 26 PERCENT REDUCTION 79.2	ACTION RECOMMENDED: - COMPOUND IS SUFFICIENTLY ACTIVE TO WARRANT FURTHER TESTING. - INSUFFICIENT ACTIVITY TO WARRANT FURTHER TESTING
3 5 5 5 4 9 9 5 14 TOTAL 26 26	ACTION RECOMMENDED: - COMPOUND IS SUFFICIENTLY ACTIVE TO WARRANT FURTHER TESTING. - INSUFFICIENT ACTIVITY TO WARRANT FURTHER TESTING OR COMPOUND IS PLACED INACTIVE BECAUSE: - COMPOUND IS A POORLY ACCEPTED TOXICANT - INADEQUATE MARGIN OF SAFETY BETWEEN AVOIDANCE
3 5 5 5 4 9 9 5 14 TOTAL 26 26 PERCENT REDUCTION 79.2 Average No. Seed Approximate Approx. No.	ACTION RECOMMENDED: - COMPOUND IS SUFFICIENTLY ACTIVE TO WARRANT FURTHER TESTING. - INSUFFICIENT ACTIVITY TO WARRANT FURTHER TESTING OR COMPOUND IS PLACED INACTIVE BECAUSE: - COMPOUND IS A POORLY ACCEPTED TOXICANT
3 5 5 9 9 9 5 14 TOTAL 26 26 PERCENT REDUCTION 79.2 Average No. Seed Consumed First Day Approximate LD mg/kg Approx. No. Seed Lethal	ACTION RECOMMENDED: - COMPOUND IS SUFFICIENTLY ACTIVE TO WARRANT FURTHER TESTING. - INSUFFICIENT ACTIVITY TO WARRANT FURTHER TESTING OR COMPOUND IS PLACED INACTIVE BECAUSE: - COMPOUND IS A POORLY ACCEPTED TOXICANT - INADEQUATE MARGIN OF SAFETY BETWEEN AVOIDANCE AND LETHAL LEVEL PRECLUDING USE AS REPELLENT. - USE AS FIELD RODENTICIDE DOUBTFUL DUE TO
3 5 5 5 4 9 9 9 5 14 4 TOTAL 26 PERCENT REDUCTION 79.2 Average No. Seed Consumed First Day Approximate LD mg/kg Seed Lethal	ACTION RECOMMENDED: - COMPOUND IS SUFFICIENTLY ACTIVE TO WARRANT FURTHER TESTING. - INSUFFICIENT ACTIVITY TO WARRANT FURTHER TESTING OR COMPOUND IS PLACED INACTIVE BECAUSE: - COMPOUND IS A POORLY ACCEPTED TOXICANT - INADEQUATE MARGIN OF SAFETY BETWEEN AVOIDANCE AND LETHAL LEVEL PRECLUDING USE AS REPELLENT. - USE AS FIELD RODENTICIDE DOUBTFUL DUE TO RATHER LOW TOXICITY OF COMPOUND
3 5 5 9 9 9 5 14 TOTAL 26 26 PERCENT REDUCTION 79.2 Average No. Seed Consumed First Day Approximate LD mg/kg Seed Lethal 5.2 12 4.9	ACTION RECOMMENDED: - COMPOUND IS SUFFICIENTLY ACTIVE TO WARRANT FURTHER TESTING. - INSUFFICIENT ACTIVITY TO WARRANT FURTHER TESTING OR COMPOUND IS PLACED INACTIVE BECAUSE: - COMPOUND IS A POORLY ACCEPTED TOXICANT - INADEQUATE MARGIN OF SAFETY BETWEEN AVOIDANCE AND LETHAL LEVEL PRECLUDING USE AS REPELLENT. - USE AS FIELD RODENTICIDE DOUBTFUL DUE TO

Endrin

BIOASSAY RECORD

TEST NO	. Standa:	rđ 36				CONCENTRATION 15 wt.
COMPAN	Y CODE _	Endrin		DRC		DATE PREP. <u>2/15/63</u> DATE TESTED <u>2/18/63</u>
	Ι			leasen// mov	T	CARRIER Wheat TEST ANIMAL Swiss white
ANIMAL	DAIL	ACCEPT	TANCE	OBSERVATION PERIOD	TOTAL	FORMULATION:
NUMBER	Î.	2	3	4_DAYS	SEED	× - CHEMICAL DISSOLVED IN ACETONE AND APPLIED TO SEED.
1	0	0/1	0		0	
2	4/1				4	
3	8				8	
4	7/1				7	ACTION RECOMMENDED:
5	5				5	COMPOUND IS SUFFICIENTLY ACTIVE TO WARRANT FURTHER
TOTAL	24				24	TESTING.
			PERCEN	T REDUCTION	86.3	 INSUFFICIENT ACTIVITY TO WARRANT FURTHER TESTING OR COMPOUND IS PLACED INACTIVE BECAUSE:
	ge No.Seed ed First Day		Approximat		Approx. No.	COMPOUND IS A POORLY ACCEPTED TOXICANT
4.			LD mg/kg 8		O.41	- INADEQUATE MARGIN OF SAFETY BETWEEN AVOIDANCE AND LETHAL LEVEL PRECLUDING USE AS REPELLENT.
COMMEN.	TS:8	- 11.7	- 100			- USE AS FIELD RODENTICIDE DOUBTFUL DUE TO RATHER LOW TOXICITY OF COMPOUND
						- OTHER
INVESTIC	ATOR:					
					BIOASS	AY RECORD
					Denver Wildli	fe Research Center
TEST NO	. Standard	1 42				CONCENTRATION1% wt.
COMPAN	Y CODE	Endrin		DRC		DATE PREP. 4/19/63 DATE TESTED 4/22/63
<u> </u>				OBSERVATION		CARRIER Wheat TEST ANIMAL Swiss white
ANIMAL		ACCEPT	ANCE	PERIOD	TOTAL	FORMULATION:
NUMBER	1	2	3	_3_DAY\$	SEED	□ CHEMICAL DISSOLVED IN ACETONE AND APPLIED TO SEED.
1	7K				7	CHEMICAL DISSOLVED IN WATER AND APPLIED TO SEED.
2	15/2				15	- OTHER
3	24K				24	
4	16/7	3/5	3/3		22	ACTION RECOMMENDED:
5	13			5	13	COMPOUND IS SUFFICIENTLY ACTIVE TO WARRANT FURTHER
TOTAL	75	3	3		81.	TESTING.
			PERCEN	T REDUCTION	53•7	- INSUFFICIENT ACTIVITY TO WARRANT FURTHER TESTING OR COMPOUND IS PLACED INACTIVE BECAUSE:
	e No.Seed ed First Day		Approximat	_	Approx. No.	COMPOUND IS A POORLY ACCEPTED TOXICANT
	15 . 0		LD mg/kg 8	<u>-</u> 3	4.1	- INADEQUATE MARGIN OF SAFETY BETWEEN AVOIDANCE AND LETHAL LEVEL PRECLUDING USE AS REPELLENT.
COMMENT	rs:	8 - 3.7	- 80			USE AS FIELD RODENTICIDE DOUBTFUL DUE TO RATHER LOW TOXICITY OF COMPOUND
	- · · · · · · · · · · · · · · · · · · ·					- OTHER
						OTHER

TEST NO	. <u>Standar</u>	<u>:d 35</u>							CONCENTRATION _	1% wt
COMPAN	Y CODE	Endr	in	DRC		DATE PRE	P	2/15/63	DATE TESTED	2/18/63
						CARRIER _		Douglas-fir	TEST ANIMAL	Peromyscus
ANIMAL	DAILY	ACCEPTA	NCE	OBSERVATION PERIOD	TOTAL	FORMULAT	ION:			•
NUMBER	1	2	3	_4_DAYS	SEED	x - CHE	MICA	L DISSOLVED IN	ACETONE AND APP	LIED TO SEED.
1	26	7/3	1/2		34	CHE	MICA	L DISSOLVED IN	I WATER AND APPLIE	D TO SEED.
2	23	0	0		23	отн	ER_			
3	41/2		,		41					
4	5	0/1	1.		6	ACTION RE	ECOM	MENDED:		
5	8/4				8	сом	POU	ND IS SUFFICIEN	ITLY ACTIVE TO WAR	RANT FURTHER
TOTAL	103	7	2		112	TES-	TING	•		
			PERCEN	IT REDUCTION	79.6				TO WARRANT FURTH D INACTIVE BECAUS	
Averag	ge No. Seed		Approximat	e	Approx. No.	-	- CO)	APOUND IS A PO	ORLY ACCEPTED TO	XICANT
	ed First Day	<u>′ </u>	LD mg/kg		Seed Lethal				IN OF SAFETY BETW	
2	20.6		12			[]_			ENTICIDE DOUBTFUL	
COMMEN	TS:						RAT	THER LOW TOXI	CITY OF COMPOUND	
							- OTH	IER		
							_			
INVESTI	GATOR:									
						SAY RECORD				
					Denver Wild	ife Research Cente	er			
	. <u>Standar</u>								CONCENTRATION _	
COMPAN	Y CODE	Endrin		DRC		DATE PRE	P	2/15/63	DATE TESTED	2/18/63
				OBSERVATION		CARRIER _		Douglas-fi	TEST ANIMAL	Swiss white
ANIMAL		ACCEPTA	· · · · · ·	PERIOD	TOTAL SEED	FORMULAT	ION:			
NUMBER	1	2	3	4 DAYS		x - CHE	MICA	L DISSOLVED IN	ACETONE AND APP	LIED TO SEED.
1	9				9	CHE	MICA	L DISSOLVED IN	WATER AND APPLIE	D TO SEED.
2	28/8				28	🗌 – отн	ER_			
3	24/17	12/30	30/17		66			····· - · · · · · · · · · · · · · · · ·		
4.	34/12	0/9	0		34	ACTION RE	ECOM	MENDED:		
5	15/5				1.5		POUNTING.		ITLY ACTIVE TO WAR	RANT FURTHER
TOTAL	110	12	30		152	_			TO WARRANT FURT	IFR TESTING
			PERCEN	T REDUCTION	66.2				D INACTIVE BECAUS	
	ge No. Seed ed First Day		Approximat LD mg/kg		Approx. No. Seed Lethal	<u> </u>	- COY	APOUND IS A PO	ORLY ACCEPTED TO	XICANT
	22.0	<u> </u>	8	<u>-</u>	Seed Fernal				IN OF SAFETY BETW L PRECLUDING USE	
COMMEN						/ _□ -			ENTICIDE DOUBTFUL	DUE TO
COMMEN						П-			LITT OF COMPOUND	
								-		
				·						

TOXICITY RECORD

Denver Wildlife Research Center

CHEMICAL Budzda DRC T	_TEST MAMMAL_Peromyscus	CHEMICAL Endrin	DRC
FORMULATION DATE 2/13/63 TEST DATE 2/13/63 OBSERVATION PERIOD 3 DAYS	ERVATION PERIOD 3 DAYS	FORMULATION DATE_2/13/63TEST DATE	_TEST DATE
TYPE OF ADMINISTRATION ORGI APPROXIMATE LD =	LD = 12 mg. /kg.	TYPE OF ADMINISTRATION OX81	Oral
FORMILLATION: 0.10 gram of 50% in 100 ml. HOH = 0.5 mg/ml	ng/m1	FORMULATION: 1 gram 50W Endrin ground	rin ground

COMMENTS

						 					l	
		·										
TIME OF DEATH	1 hour	1st overnight period										
Time of Admin.	2:30								:			
Actual Dosage (ml)	0.83	39.0	ਲ•0	0.29	41. 0							
Dosage Nor mg/kg	18	71	8	5.5	3.7		-	1				
Sex and Weight	M 23	M 26	M 21	M 26	M 19							
Animal No.	A 1	2	ю	4	5							

Method employed as described by Wm. Deichman and T. LeBlanc in the Journal of Industrial Hygiene and Toxicology, Vol. 25, No. 9, pp. 415-417.

Investigator_

TOXICITY RECORD

Denver Wildlife Research Center

CHEMICAL	Endrin	DRC		TEST MAMMAL Whit	TEST MAMMAL White micefemales
FORMULATIO	N DATE_2/13	3/63TEST DA	ATE_2/13/63	FORMULATION DATE 2/13/63TEST DATE 2/13/63OBSERVATION PERIOD3	3 DAYS
TYPE OF ADM	TYPE OF ADMINISTRATION_	Oral	APPROX	APPROXIMATE LD =	8 mg. /kg.
FORMULATIO	N: 1 gram 50	W Endrin grou	nd with 1 gra	FORMULATION: 1 gram 50W Endrin ground with 1 gram Acacia gum suspended in water.	d in water.
5	5 mg/ml.* 1 mg/ml.**	1 mg/ml.**	0.5 mg/ml.***	***	
COMMENTS.					

TIME OF DEATH	1st overnight period											
Time of Admin.	3:10											
Actual Dosage (ml)	0.260*	0.784**	0.504**	0.348**	0.216**	0.165**	0.24***					
Dosage Nor mg/kg	1,2	82	1.8	12	8	5.5	3.7					
Sex and Weight	F 31	F 28	F 28	F 29	F 27	F 30	F 33					
Animal No.	A 1	N	E	#	ī,	9	7			i		

Method employed as described by Wm. Deichman and T. LeBlanc in the Journal of Industrial Hygiene and Toxicology, Vol. 25, No. 9, pp. 415-417.

GPO 835-723

GPO 835-723

SEED PHYTOTOXICITY RECORD

CHEMICAL	Enda	rin E	IOASSAY F	REFERENCE	Stan.	34&30	<u>6</u> date i	PREPARED_	2/15/63
SEEDW	heat	_DATE PLA	ANTED	2/20/63	_СНЕМ	ICAL (CONCEN.	TRATION	1% wt.
SEED CON	TA NOITIC	TIME OF TR	EATMENT:		Unstrati	fied	х;	Stratifie	d
FORMULAT	ION:								
x	CHEMICA	L DISSOLV	ED IN ACE	TONE AND A	PPLIED	TO SE	EED.		
	CHEMICA	L SUSPEND	ED IN ADH	ESIVE AND	APPLIE	D TO-S	SEED.		
	OTHER_								
			GI	ERMINATION	RESUL	TS			
DATE	2/25	2/28	3/4					PLANTED/G	ERMINATED
CONTROL	94	96	96					1.00/9	16
TREATED	87	93	97					100/9	7
			CDOW	TH RATE A	ND FOR				•
Slight	Pron	ounced	GROW	IN RAIE A	ND FOR	im			
]		ABNORMAL	. FOLIAR DE	VELOPA	MENT.			
				. ROOT DEVI					
				FOLIAR CO					
	x			APPEARED I					
Comm									
Commi	em s			•					
1.1								-	
				Investigat	or				

TEST NO.	Standar	d 25						CONCENTRATION _	1% wt.
COMPANY	CODE	1080)	DRC	· · · · · · · · · · · · · · · · · · ·	DATE PREP	2/15/63	DATE TESTED _	2/18/63
,				·		CARRIER	Wheat	TEST ANIMAL	Peromyscus
ANIMAL	DAILY	ACCEPT	ANCE	OBSERVATION PERIOD	TOTAL	FORMULATION:			
NUMBER	1	2	3	DAYS	SEED	CHEMICAL	DISSOLVED I	N ACETONE AND APP	LIED TO SEED.
1	6				6	x - CHEMICAL	. DISSOLVED I	N WATER AND APPLI	ED TO SEED.
2	3				3	OTHER			
3	7				7			and .	
4	3/1				3	ACTION RECOMM	MENDED:		
5	7				7	- COMPOUN TESTING.	D IS SUFFICIE	NTLY ACTIVE TO WAI	RRANT FURTHER
TOTAL	26		1		26	_	ENT ACTIVIT	Y TO WARRANT FURT	HER TESTING
	<u>.</u>		PERCEN	T REDUCTION	79•2			ED INACTIVE BECAUS	
-	e No.Seed ed First Day		Approximat		Approx. No.	COM	POUND IS A P	OORLY ACCEPTED TO	DXICANT
	.2		LD mg/kg		Seed Lethal 0.22			GIN OF SAFETY BETY EL PRECLUDING USE	
	rs: Samp	 Na 087	•					DENTICIDE DOUBTFUI	L DUE TO
COMMEN	3: <u>Comp</u>	TE 301	<u> </u>	23.0 - 200				TOTAL COMPONENT	
						٠٠٠٠ ا			
TEST NO	. Standa:	<u>rd 69</u>						CONCENTRATION _	0.05% wt.
COMPAN	Y CODE	108	<u> </u>	DRC		DATE PREP. 8/9	9/63	DATE TESTED_	8/12/63
				OBSERVATION		CARRIER Whe	eat	TEST ANIMAL _	Peromyscus
ANIMAL		Y ACCEPT		PERIOD	TOTAL SEED	FORMULATION:			
NUMBER		2	3	DAYS	SEED	- CHEMICAI	_ DISSOLVED	IN ACETONE AND APP	PLIED TO SEED.
1	6/1				6	x - CHEMICAL	DISSOLVED	IN WATER AND APPLI	ED TO SEED.
2	3	0	0		3	OTHER			
3	3	1			14				
4	2				. 2	ACTION RECOM	MENDED:		
5	5/2	0			5	COMPOUN TESTING.	D IS SUFFICIE	NTLY ACTIVE TO WA	RRANT FURTHER
TOTAL	19	1	0		20			Y TO WARRANT FURT	
			PERCEN	IT REDUCTION	91.1			ED INACTIVE BECAUS	
	e No.Seed ed First Da	у	Approximate LD mg/kg		Approx. No. Seed Lethal			OORLY ACCEPTED TO	
3	.8		5•5		4.5			GIN OF SAFETY BETY EL PRECLUDING USE	
COMMENT	rs:	5.5 - 0.8	3 - 40					DENTICIDE DOUBTFUI	_ DUE TO
		Sample 98	37	·		□- отн	ER		
				·					
INVESTIG	ATOR:								

TEST NO	. Standar	rd 27						CONCENTRATION _	1% wt.
COMPAN	Y CODE	1080		DRC		DATE PREP	2/15/63	DATE TESTED	2/18/63
				ODSEDVATION!		CARRIER	Wheat	TEST ANIMAL	Swiss white
ANIMAL	DAILY	ACCEPTA	NCE	OBSERVATION PERIOD	TOTAL	FORMULATION:			
NUMBER	. 1	2	3	4_DAYS	SEED	CHEMICA	AL DISSOLVED I	ACETONE AND APP	LIED TO SEED.
1	2				2	X - CHEMICA	L DISSOLVED II	WATER AND APPLIE	D TO SEED.
2	14				4	_ OTHER_			
3	6/1	1	4/3		11				
4	20K/1	410			24	ACTION RECOL	MENDED:		
5	4				14	П – сомрои	ND IS SUFFICIEI	NTLY ACTIVE TO WAR	RANT FURTHER
TOTAL	36	5	4		45	TESTING	•		
, , , , , , ,		·	PERCEN	T REDUCTION	77.5			TO WARRANT FURTH D INACTIVE BECAUS	
Averse	e No. Seed		pproximat		Approx. No.	' □- co	MPOUND IS A PO	ORLY ACCEPTED TO	XICANT
	ed First Day		LD mg/kg		Seed Lethal	_		IN OF SAFETY BETW	
	7.2		1.2		0.61			L PRECLUDING USE	
COMMEN	rc. Sa	mnle 987	12 -	11.8 - 80				ENTICIDE DOUBTFUL	DUE TO
COMMEN	13:	<u> </u>			•			:	
•							1ER	,	
						·	· · · · · · · · · · · · · · · · · · ·	* ***	· .
INVESTIG	ATOR:			•					
					BIOA	SSAY RECORD			
					Denver Wild	llife Research Center	•		
TEST NO	o. <u>Standa</u> :	rd 44						CONCENTRATION _	.1% wt.
COMPAN	Y CODE _	1080		DRC		_ DATE PREP	4/19/63	DATE TESTED _	4/22/63
	·			Terese		CARRIER	Wheat	TEST ANIMAL	Swiss white
ANIMAL	DAIL	Y ACCEPTA	NCE	OBSERVATION PERIOD	TOTAL	FORMULATION:	:		•
NUMBER	1	2	3	_3_DAYS	SEED	_ CHEMIC	AL DISSOLVED I	N ACETONE AND APP	LIED TO SEED.
1	25K	10	0		35	X - CHEMIC	AL DISSOLVED I	N WATER AND APPLI	ED TO SEED.
2	22K	12/10			43	OTHER_		-	
3	19	0	0		19]			•
4		3	9/2	1	29	. ACTION RECO	MMENDED:	,	
5	17					† <i>'</i> .		NTLY ACTIVE TO WAR	00 ANT EHOTHE
	23K	6	7	-	. 36	TESTING		MILI ACTIVE TO WAT	KKANI FURINGA
TOTAL	106	31	25	<u> </u>	162			TO WARRANT FURT	
			PERCE	T REDUCTION.	56.8	OR COM	POUND IS PLACI	ED INACTIVE BECAUS	E:
	ge No.Seed ned First Da		Approxima LD mg/kg		Approx. No. Seed Lethal	□-co	MPOUND IS A PO	OORLY ACCEPTED TO	XICANT
		<u> </u>		<u> </u>				GIN OF SAFETY BETW EL PRECLUDING USE	
	21.2	— —	12	<u> </u>	6.1		E AS FIELD RÖD	ENTICIDE DOUBTFUL	
COMMEN	15:	12 - 3.5	- 0			_		CITY OF COMPOUND	
						от	HER		
								· · · · · · · · · · · · · · · · · · ·	
INVESTI	GATOR:					_			

TEST NO	Standar	<u>a 26</u>				CONCENTRATION1% wt.
COMPAN	CODE	1080		DRC		DATE PREP. 2/15/63 DATE TESTED 2/18/63
				lan ammi i mi ovil		CARRIER Douglas-fir TEST ANIMAL Percmyscus
ANIMAL	DAILY	ACCEPTA	NCE	OBSERVATION PERIOD	TOTAL	FORMULATION:
NUMBER	1	2	3	4 DAYS	SEED	CHEMICAL DISSOLVED IN ACETONE AND APPLIED TO SEED.
1	48/3	4/2	3		55	x - CHEMICAL DISSOLVED IN WATER AND APPLIED TO SEED.
2	25/3	1/0	0		26	OTHER
3	30/0	4/o	0		34	
4	47/3				47	ACTION RECOMMENDED:
5	28/2	0/1	1		29	- COMPOUND IS SUFFICIENTLY ACTIVE TO WARRANT FURTHER TESTING.
TOTAL	178	9	4		191	☐ - INSUFFICIENT ACTIVITY TO WARRANT FURTHER TESTING
			PERCEN	IT REDUCTION	70.6	OR COMPOUND IS PLACED INACTIVE BECAUSE:
	e No. Seed		Approximat		Approx. No.	- COMPOUND IS A POORLY ACCEPTED TOXICANT
	ed First Day		LD mg/kg		Seed Lethal	— INADEQUATE MARGIN OF SAFETY BETWEEN AVOIDANCE AND LETHAL LEVEL PRECLUDING USE AS REPELLENT.
	35.6		5.5			. — USE AS FIELD RODENTICIDE DOUBTFUL DUE TO
COMMEN	TS:S	ample 98'	7			
						OTHER
						SSAY RECORD
TEST N	o. <u>Standa</u>	rd 28				CONCENTRATION
COMPAN	IY CODE	1080		_DRC		
						CARRIER <u>Douglas-fir</u> TEST ANIMAL <u>Swiss white</u>
ANIMAL	DAIL	ACCEPT	ANCE	OBSERVATION PERIOD	TOTAL	FORMULATION:
NUMBE	₹ 1	2	3	4_DAYS	SEED	CHEMICAL DISSOLVED IN ACETONE AND APPLIED TO SEED.
1	24/1				24	□ CHEMICAL DISSOLVED IN WATER AND APPLIED TO SEED.
2	42K/8	4/36	11.		57	_ OTHER
3	40K/10	0/1	2/1		42	
4	14/3	22/21	12/3		48	ACTION RECOMMENDED:
5	34K/4				34	— COMPOUND IS SUFFICIENTLY ACTIVE TO WARRANT FURTHER TESTING.
TOTAL	154	26	25		205	- INSUFFICIENT ACTIVITY TO WARRANT FURTHER TESTING
	<u></u>		PERCE	NT REDUCTION	62.7	OR COMPOUND IS PLACED INACTIVE BECAUSE:
	ige No. Seed		Approximo		Approx. No.	COMPOUND IS A POORLY ACCEPTED TOXICANT
Consu	med First Da	<u> </u>	LD mg/k	<u>-</u>	Seed Lethal	- INADEQUATE MARGIN OF SAFETY BETWEEN AVOIDANCE AND LETHAL LEVEL PRECLUDING USE AS REPELLENT.
	. 30.8		12			- USE AS FIELD RODENTICIDE DOUBTFUL DUE TO
COMME	NTS:S	ample 987	7			RATHER LOW TOXICITY OF COMPOUND
						OTHER
						_
INIVECT	ICATOR:	•				

TOXICITY RECORD

Denver Wildlife Research Center

TOXICITY RECORD
Denver Wildlife Research Center

CHEMICAL	AL 1080		DRC		TEST MAMMAL Peromyscus	CHEMICAL	,L 1080		DRC		TEST MAMMAL Swiss white-males	male
FORMUL	FORMULATION DATE 2/25/63		_теѕт рате <u>_2/25/63</u>		OBSERVATION PERIOD 2 DAYS	FORMULA	FORMULATION DATE 2/25/63		_TEST DATE_ <u>2/25/63</u>		OBSERVATION PERIOD2	DAY
TYPEO	TYPE OF ADMINISTRATION	ATION Oral		APPROXIMATE LD	LD = 5.5 mg. /kg.	TYPE OF	TYPE OF ADMINISTRATION_	TION OTAL	A	APPROXIMATE LD =	LD = 12 mg.	_k
FORMUL	FORMULATION: 0	.10 gram in H	0.10 gram in HOH to make 100 ml. solution.	O ml. soluti	on.	FORMUL	ATION: 0.3	FORMULATION: 0.10 gram in HOH to make 100 ml. solution.	to make 100	ml. soluti	•uo	
		1 mg/ml. *	*New solution 0.5 mg/ml.	0.5 mg/ml.			I, n	l mg/ml. *	*New preparation 0.5 mg/kg.	on 0.5 mg/	kg.	
COMMENTS:		Sample 987				COMMENTS:	ļ	Sample 987				
				·								
Animal No.	Sex and Weight	Dosage Nor mg/kg	Actual Dosage (ml)	Time of Admin.	TIME OF DEATH	Animal No.	Sex and Weight	Dosage Nor mg/kg	Actual Dosage (ml)	Time of Admin.	TIME OF DEATH	
B 15	F 19	12	0.23	3:30	1st overnight period	В 9	М 19	12	0.23	3:30	1st overmight period	
16	F 17	8	0.14		1st overnight period	10	% %	8	0.26			
٦ ت	M 20	5.5	0.11		1st overnight period	Ħ	M 26	5.5	41.0			
Ø	М 19	3.7	70.0			12	9т м	3.7	90.0			
က	M 21	4.5	0.05			13	M 22	2.4	0.05			
4	M 20	1.6	0.032			1,4	M 20	1.6	0.032	•		
AI	F 23	दा	0.55*	2/28 9:00	6 hours	A 5	M 30	12	0.72	2/28 9:00	1st overnight period	
αı	м 19	8	0.30*		lst overnight period	9	M St	8	0.50			
3	M 22	5.5	%†7°0			۲	м 26	5.5	0.29			
4	F 20	3.7	0.15*			8	M 28	3.7	0.21			٠
i												
i												
				-								•
				•								
Method (Industric	amployed as del Il Hygiene and	escribed by Wm. D ! Toxicology, Vol.	Method employed as described by Wm. Deichman and T. LeBlanc in the Journal of Industrial Hygiene and Toxicology, Vol. 25, No. 9, pp. 415-417.	Blanc in the Jo 5-417.	wrnal of	Method en Industrial	mployed as de I Hygiene and	Method employed as described by Wm. Deichman and T. LeBlanc in the Journal of Industrial Hygiene and Toxicology, Vol. 25, No. 9, pp. 415-417.	ichman and T. Le 25, No. 9, pp. 415	Blanc in the J -417.	ournal of	

Investigator_

SEED PHYTOTOXICITY RECORD

CHEMICAL	108	<u> </u>	IOASSAY RE	FERENCE	Stan. 27	DATE F	REPARED_	2/15/63
SEED	Theat	_DATE PL	ANTED 2	/20/63	_CHEMICAL	. CONCENT	RATION	1% wt.
SEED COND	TA NOITIC	TIME OF TR	EATMENT:		Unstratified_	x;	Stratifi	ed
FORMULAT	ION:							
	CHEMICA	L DISSOLV	ED IN ACET	ONE AND A	PPLIED TO	SEED.		
	CHEMICA	L SUSPEND	ED IN ADHE	SIVE AND	APPLIED TO	SEED.		
x	OTHER_	НОН					<u> </u>	
		Sample	987					
			GE	RMINATION	RESULTS			
DATE	2/25	2/28	3/4				PLANTED/	GERMINATED
CONTROL	94	96	96				100/	96
TREATED	10	58	69				100/	69
	GROWTH RATE AND FORM							
Slight		ounced						
الا	L	۲	ABNORMAL	FOLIAR DI	EVELOPMEN.	т.		
	[ABNORMAL	ROOT DEV	ELOPMENT.			
	[ABNORMAL	FOLIAR CO	LORATION.			
	x		SEEDLING A	PPEARED	NORMAL.			
Comm	ents:	Reduced v	igor					
				lnvestiga	tor			

TEST NO	. Standa:	rd 29							CONCENTRATION _	1% wt.
COMPANY	Y CODE	Strychni	ne	DRC		_ D	ATE PREP	2/15/63	DATE TESTED	2/18/63
· · · · · · · · · · · · · · · · · · ·				1		, c	ARRIER	Wheat	TEST ANIMAL	Peromyscus
ANIMAL	DAIL	ACCEPT	ANCE	OBSERVATION PERIOD	TOTAL	F-	ORMULATION:			
NUMBER	1	2	3	DAYS	SEED	[_ CHEMICAI	L DISSOLVED I	N ACETONE AND APP	LIED TO SEED.
1	5				5] [_ CHEMICAI	L DISSOLVED I	N WATER AND APPLIE	D TO SEED.
2	1				1	. [x - OTHER_	Chloroform		
3	3/1				3					
4	1			·	1.	A	CTION RECOM	MENDED:		
5	1/1				1			D IS SUFFICIE	NTLY ACTIVE TO WAR	RANT FURTHER
TOTAL	1.1.				11.		TESTING.			
			PERCEN	IT REDUCTION	91.2		_ - INSUFFIC OR COMPO	IENT ACTIVITY DUND IS PLACE	' TO WARRANT FURTH ED INACTIVE BECAUSE	IER TESTING E:
	e No. Seed		Approximat		Approx. No.		сом	POUND IS A PO	ORLY ACCEPTED TO	XICANT
Consume	ed First Day	<u>′</u> –	LD mg/kg	 _	Seed Lethal	-			SIN OF SAFETY BETWI	
	2.2		12		0.49	•			ENTICIDE DOUBTFUL	
COMMENT	rs: <u>12</u>	- 4.5 -	100						CITY OF COMPOUND	
							– ОТН	ER		
						•				·
TEST NO	. Standa:	rd 45			Denver Wild	life Rese	arch Center		CONCENTRATION _	.1% wt.
	Y CODE		ine	DRC		D	ATE PREP.	4/19/63	DATE TESTED	
						=			TEST ANIMAL	
ANIMAL	DAIL	ACCEPT	ANCE	OBSERVATION PERIOD	TOTAL	l	ORMULATION:	WHO W	TEST ANIMAL	
NUMBER	1	2	3	_3DAYS	SEED	'		I DISSOLVED I	N ACETONE AND APP	LIED TO SEED
, ,	9				9	,			N WATER AND APPLIE	
2	24/1	24/1	25		73	,	_ '	Heated ben		D TO SEED.
3	25	25	25		75.	'	<u></u>			• • • • • • • • • • • • • • • • • • • •
4	8				8	- A	CTION RECOM	MENDED:		
5 .	.25	25	25		75	i [_ COMPOUN	D IS SUFFICIEI	NTLY ACTIVE TO WAR	RANT FURTHER
TOTAL	91	74	75		240	,	TESTING.			
			PERCEN	T REDUCTION	12.7	L	- INSUFFICE OR COMPO	IENT ACTIVITY DUND IS PLACE	TO WARRANT FURTH D INACTIVE BECAUSE	IER TESTING ::
	e No. Seed ed First Day		Approximat		Approx. No.		сом	POUND IS A PO	ORLY ACCEPTED TO	KICANT
Consume	18.2	<u> </u>	LD mg/kg		Seed Lethal		INAD	EQUATE MARG	IN OF SAFETY BETWEEL PRECLUDING USE A	EN AVOIDANCE
COMMENT		 12 - 3.7			#•7		USE	AS FIELD ROD	ENTICIDE DOUBTFUL	
		3-1					_		CITY OF COMPOUND	
										
					_					

Strychnine

BIOASSAY RECORD

TEST NO	<u>Standa</u>	rd 31				CONCENTRATION 1% wt.
COMPANY	CODE	Strychn	ine	DRC		DATE PREP. <u>2/15/63</u> DATE TESTED <u>2/18/63</u>
· 	·			OBSERVATION		CARRIER Wheat TEST ANIMAL Swiss white
ANIMAL	DAIL	ACCEP	TANCE	PERIOD	TOTAL	FORMULATION:
NUMBER	1	2	3	DAYS	SEED	- CHEMICAL DISSOLVED IN ACETONE AND APPLIED TO SEED.
1	2/1				2	- CHEMICAL DISSOLVED IN WATER AND APPLIED TO SEED.
2	1/1				1	x - OTHER_ Chloroform
3	4/8				14	
4	1/3	7 A T		¥	1	ACTION RECOMMENDED:
5	1/1	3			4	_ COMPOUND IS SUFFICIENTLY ACTIVE TO WARRANT FURTHER
TOTAL	9	3			12	TESTING.
			PERCEN	IT REDUCTION	92.0	INSUFFICIENT ACTIVITY TO WARRANT FURTHER TESTING OR COMPOUND IS PLACED INACTIVE BECAUSE:
	e No. Seed		Approxima	e J	Approx. No.	COMPOUND IS A POORLY ACCEPTED TOXICANT
Consume	1.8	<u>′</u> -	LD mg/kg 28		1.4	— INADEQUATE MARGIN OF SAFETY BETWEEN AVOIDANCE AND LETHAL LEVEL PRECLUDING USE AS REPELLENT.
COMMENT	·\$:2	 3 - 1. 3		. 		USE AS FIELD RODENTICIDE DOUBTFUL DUE TO RATHER LOW TOXICITY OF COMPOUND
COMMENT	••					T~ OTHER
						SAY RECORD
		- 1.C			Denver Wild	ife Research Center
	. Standa					CONCENTRATION 0.25% wt.
COMPAN	Y CODE	Stryc	nnine	DRC		DATE PREP. 4/19/63 DATE TESTED 4/22/63
ANIMAL	DAIL	Y ACCEP	TANCE	OBSERVATION	TOTAL	CARRIER Wheat TEST ANIMAL Swiss white
NUMBER	1	2	3	PERIOD 3 DAYS	TOTAL SEED	FORMULATION:
1	22/2		7.0	3_DA13	Cl.	CHEMICAL DISSOLVED IN ACETONE AND APPLIED TO SEED.
2	23/2	25	16		64	CHEMICAL DISSOLVED IN WATER AND APPLIED TO SEED.
3	9				9	X - OTHER <u>Heated benzene</u>
4	<u>7</u> 9/2				7	ACTION RECOMMENDED:
5		<u> </u>			9	
	3	05	76		3	 COMPOUND IS SUFFICIENTLY ACTIVE TO WARRANT FURTHER TESTING.
TOTAL	51	25	16 PERCE	T REDUCTION	92 47 . 4	 INSUFFICIENT ACTIVITY TO WARRANT FURTHER TESTING OR COMPOUND IS PLACED INACTIVE BECAUSE:
	e No. Seed		Approxima	te ,	Approx. No.	- COMPOUND IS A POORLY ACCEPTED TOXICANT
	ed First Da	<u>,</u>	LD mg/kg 28	<u> </u>	5.7	- INADEQUATE MARGIN OF SAFETY BETWEEN AVOIDANCE AND LETHAL LEVEL PRECLUDING USE AS REPELLENT.
COMMENT		3 - 1.8		_		USE AS FIELD RODENTICIDE DOUBTFUL DUE TO RATHER LOW TOXICITY OF COMPOUND
						OTHER
INVECTIO	ATOD					

TEST NO	. <u>Standar</u>	đ 30				CONCENTRATION1% wt.
COMPAN	Y CODE _S	trychnine	9	DRC	· · · · · · · · · · · · · · · · · · ·	DATE PREP. 2/15/63 DATE TESTED 2/18/63
				los annu mioril		CARRIER <u>Douglas-fir</u> TEST ANIMAL <u>Peromyscus</u>
ANIMAL	DAILY	ACCEPTA	NCE	OBSERVATION PERIOD	TOTAL	FORMULATION:
NUMBER	1	2	3	_4_DAYS	SEED	CHEMICAL DISSOLVED IN ACETONE AND APPLIED TO SEED.
1	12/2	1	11		24	CHEMICAL DISSOLVED IN WATER AND APPLIED TO SEED.
2	42	42	21/1		105	x - OTHER Chlorofonn
3	50	42/2	1/1		93	
4	48/2	49	50		147	ACTION RECOMMENDED:
5	49	42/1	3		94	COMPOUND IS SUFFICIENTLY ACTIVE TO WARRANT FURTHER
TOTAL	201	176	86		463	TESTING.
			PERCEN	T REDUCTION	38.3	OR COMPOUND IS PLACED INACTIVE BECAUSE:
	e No. Seed		pproximat	e A	approx. No.	COMPOUND IS A POORLY ACCEPTED TOXICANT
Consum	ed First Day	-	LD mg/kg	<u>_s</u>	eed Lethal	- INADEQUATE MARGIN OF SAFETY BETWEEN AVOIDANCE
141	0.2		12			AND LETHAL LEVEL PRECLUDING USE AS REPELLENT.
COMMENT	'S:					USE AS FIELD RODENTICIDE DOUBTFUL DUE TO RATHER LOW TOXICITY OF COMPOUND
						OTHER
NVESTIG	ATOR:					
		i				SSAY RECORD
TEST NO	. Standa	rd 32		•		CONCENTRATION 1% wt.
COMPAN	Y CODE _	Strychnin	e	DRC		DATE PREP. 2/15/63 DATE TESTED 2/25/63
	Г			OBSERVATION		CARRIER <u>Douglas-fir</u> TEST ANIMAL <u>Swiss white</u>
ANIMAL		ACCEPTA	NCE	PERIOD	TOTAL	FORMULATION:
NUMBER	1	2	3	4 DAYS	SEED	- CHEMICAL DISSOLVED IN ACETONE AND APPLIED TO SEED.
t	47/3	14/21	10/8		71	CHEMICAL DISSOLVED IN WATER AND APPLIED TO SEED.
2	25/24	28/13	36/11		89	X - OTHER Chloroform
3	44/6	49/1	30/12		123	
4	10/9	4/2	1/3		15	ACTION RECOMMENDED:
5	34/16	46/4	46		126	COMPOUND IS SUFFICIENTLY ACTIVE TO WARRANT FURTHER
TOTAL	160	141	123		424	TESTING.
<u> </u>			PERCEN	IT REDUCTION	43.5	OR COMPOUND IS PLACED INACTIVE BECAUSE:
	je No. Seed		pproxima	te ,	Approx. No.	
Consum	ed First Day	<u>′ </u>	LD mg/kg	<u> </u>	eed Lethal	- INADEQUATE MARGIN OF SAFETY BETWEEN AVOIDANCE
	32.0		28			AND LETHAL LEYEL PRECLUDING USE AS REPELLENT.
COMMEN	TS:					The USE AS FIELD RODENTICIDE DOUBTFUL DUE TO RATHER LOW TOXICITY OF COMPOUND
						OTHER
						-
INVESTIC	ATOR:					

2 DAYS

28 mg. /kg. oil, solvent

Swiss white--males

TOXICITY RECORD

TOXICITY RECORD	TOXICITY RECORD
Denver Wildlife Research Center	Denver Wildlife Research Center
HEMICAL Strychnine DRC TEST MAMMAL Percomy seus	CHEMICAL Strychnine DRC TEST MAMMAL SWIS
ORMULATION DATE. 2/25/63 TEST DATE. 2/26/63 OBSERVATION PERIOD 2 DAYS	FORMULATION DATE 2/25/63 TEST DATE 2/26/63 OBSERVATION PERIOD
YPE OF ADMINISTRATION ONE. APPROXIMATE LD = 12 mg./g.	TYPE OF ADMINISTRATIONORGIAPPROXIMATE LD =2
ORMULATION: 0.10 gram dissolved in chloroform, placed into corn oil, solvent	FORMULATION: 0.10 grem dissolved in chloroform, placed into corn oil,
evaporated; 100 ml. solution prepared.	evaporated; 100 ml. solution prepared.

COMMENTS: 1 mg/ml solution

1 mg/ml. solution

COMMENTS:

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22 23 ₹ 52 56 27 82

TIME OF DEATH	30 mîn.										
Time of Admin. T	12:35										
Actual Dosage (ml)	0.59	24.0	0.23	8.0°	0.15	90.0	190.0				
Dosage Nor mg/kg	8	18	21	80	5.5	3.7	2,4				
Sex and Weight	id M	92	61	27	27	ଷ	କ୍ଷ				
Animal No.	C1.5	97	17	8	ĘĮ.	જ્ઞ	ឥ				
									1		1
TIME OF DEATH	30 mîn.	30 min.	30 min.	-							
Time of Admin.	५६:टा										
Actual Dosage (ml)	0.53	0.34	0.25	0.17	0.13	0.09	0.08				

Method employed as described by Wm. Deichman and T. LeBlanc in the Journal of Industrial Hygiene and Toxicology, Vol. 25, No. 9, pp. 415-417.

Method employed as described by Win. Deichman and T. LeBlanc in the Journal of Industrial Hygiene and Toxicology, Vol. 25, No. 9, pp. 415-417.

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SEED PHYTOTOXICITY RECORD

CHEMICAL	Strychn	ine B	IOASSAY RE	FERENCE.	Stan. 2	<u>9&31</u> date p	REPARED	2/15/63
SEED	Wheat	_DATE PLA	NTED_2/	20/63	_CHEMIC	AL CONCENT	RATION	1% wt.
SEED COND	T TA NOITIC	IME OF TR	EATMENT:		Unstratifie	ed <u>x</u> ;	Stratified_	<u></u> .
FORMULAT	ION:							
	CHEMICA	L DISSÖLVI	ED IN ACET	ONE AND A	PPLIED T	ro seed.		
	CHEMICA	L SUSPEND	ED IN ADHE	SIVE AND	APPLIED	TO SEED.		
\mathbf{x}	OTHER_	Chlorofo	orm					
							·	
			GE	RMINATION	RESULT	·s		
DATE	2/25	2/28	3/4	,			PLANTED/GE	RMINATED
CONTROL	94	96	96				100/96	
TREATED	81	85	89				1.00/89	
GROWTH RATE AND FORM								
311911	100		ABNORMAL	FOLIAR DI	VEI OPW	FNT		
	[_	ABNORMAL	•				
	, 1	_	ABNORMAL					
			SEEDLING A					
Comm	nents:						-	
		· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	<u> </u>				
				lnvestiga	tor			·

TEST NO. Standard 37	CONCENTRATION
COMPANY CODEORC	71 ¹ 4 DATE PREP. 2/15/63 DATE TESTED 2/18/63
I do a rout riout	CARRIER Wheat TEST ANIMAL Peromyscus
ANIMAL DAILY ACCEPTANCE OBSERVATION PERIOD	TOTAL FORMULATION:
NUMBER 1 2 3 DAYS	SEED — CHEMICAL DISSOLVED IN ACETONE AND APPLIED TO SEED.
1 3	3 — CHEMICAL DISSOLVED IN WATER AND APPLIED TO SEED.
2 4	<u> </u>
3 3	3
4 6	6 ACTION RECOMMENDED:
5 5K	5 — COMPOUND IS SUFFICIENTLY ACTIVE TO WARRANT FURTHER
TOTAL 21	TESTING.
PERCENT REDUCTION	83.2 - INSUFFICIENT ACTIVITY TO WARRANT FURTHER TESTING OR COMPOUND IS PLACED INACTIVE BECAUSE:
	prox. No COMPOUND IS A POORLY ACCEPTED TOXICANT
	- INADEQUATE MARGIN OF SAFETY BETWEEN AVOIDANCE AND LETHAL LEVEL PRECLUDING USE AS REPELLENT.
	USE AS FIELD RODENTICIDE DOUBTFUL DUE TO
COMMENTS: 18 - 5.8 - 100	RATHER LOW TOXICITY OF COMPOUND
	OTHER
D.	BIOASSAY RECORD
TEST NO. Standard 61	CONCENTRATION 0.15% wt.
	DATE PREP
DICDIC	CARRIER Wheat TEST ANIMAL Peromyscus
ANIMAL DAILY ACCEPTANCE OBSERVATION PERIOD	TOTAL FORMULATION:
NUMBER 1 2 3 14 DAYS	SEED
1 17	17 — CHEMICAL DISSOLVED IN WATER AND APPLIED TO SEED.
2 12	12
3 8	8
4 16K	16 ACTION RECOMMENDED:
5 19	19 — COMPOUND IS SUFFICIENTLY ACTIVE TO WARRANT FURTHER
TOFAL 72	TESTING.
PERCENT REDUCTION	142.14 INSUFFICIENT ACTIVITY TO WARRANT FURTHER TESTING OR COMPOUND IS PLACED INACTIVE BECAUSE:
	Prox. No COMPOUND IS A POORLY ACCEPTED TOXICANT
	ed Lethal
14.4 18	I - INADEQUATE MARGIN OF SAFETY BETWEEN AVOIDANCE
	4.9 AND LETHAL LEVEL PRECLUDING USE AS REPELLENT. USE AS FIELD RODENTICIDE DOUBTFUL DUE TO
COMMENTS: <u>18 - 2.9 - 100</u>	AND LETHAL LEYEL PRECLUDING USE AS REPELLENT. - USE AS FIELD RODENTICIDE DOUBTFUL DUE TO RATHER LOW TOXICITY OF COMPOUND
COMMENTS:18 - 2.9 - 100	4.9 AND LETHAL LEYEL PRECLUDING USE AS REPELLENT. USE AS FIELD RODENTICIDE DOUBTFUL DUE TO

TEST NO	. <u>Standar</u>	<u>d 39</u>					CONCENTRATION _	1% wt.
COMPANY	Y CODE	Coded	DRC <u>714</u>		DATE PREP.	2/15/63	DATE TESTED	2/18/63
					CARRIER	Wheat	TEST ANIMAL	Swiss white
ANIMAL	DAILY	ACCEPTANO	DBSERVAT E PERIOD		FORMULATION:			
NUMBER	I	2	3DA	YS SEED	x - CHEMICA	L DISSOLVED	IN ACETONE AND APPE	LIED TO SEED.
1	17/1	1.47 A.		17	— CHEMICA	L DISSOLVED	IN WATER AND APPLIE	D TO SEED.
2	7/1			7	OTHER_			
3	8/1			8				
-4	11/1			끄	ACTION RECOM	MENDED:		
5	2/2			2			ENTLY ACTIVE TO WAR	RANT FURTHER
TOTAL	45			45	TESTING			
		Р	ERCENT REDUCTI	ON 64.0	OR COMP	CIENT ACTIVIT OUND IS PLAC	Y TO WARRANT FURTH ED INACTIVE BECAUSE	IER TESTING E:
Averag	e No. Seed	Арр	roximate	Approx. No.		APOUND IS A P	OORLY ACCEPTED TO	XICANT
Consum	ed First Day		mg/kg	Seed Lethal			RGIN OF SAFETY BETWI	
9	.0	<u> </u>	12	0.61	AND	LETHAL LEV	'EL PRECLUDING USE /	AS REPELLENT.
COMMENT	rs: <u>12</u>	- 14.8 - 1	00				DENTICIDE DOUBTFUL (ICITY OF COMPOUND	DUE TO
					отн	1ER		

INVESTIG	ATOR:							
					•			
				BIOAS	SAY RECORD			
				Denver Wild	life Research Center			
TEST NO	. Standar	rd 48					CONCENTRATION _	.1% wt.
		Coded	DRC7	14	DATE PREP	4/19/63	DATE TESTED	
							TEST ANIMAL	
ANIMAL	DAILY	ACCEPTANO	OBSERVAT		FORMULATION:			
NUMBER	1	2	3 DA	SEED	_	L DISSOLVED	IN ACETONE AND APPI	IED TO SEED
1	21/4			21			IN WATER AND APPLIE	
2	21/4			21	- OTHER_	12 013302720	IN HATEK AND ATTEL	
3	25			25		***************************************		
4	25			25	ACTION RECOM	MENDED:		·
5	25			25	_		ENTLY ACTIVE TO WAR	DANT EUDTUED
	117			117	TESTING		INITI ACTIVE TO WAR	KANT FURTHER
TOTAL	171			()			Y TO WARRANT FURTH	
L			ERCENT REDUCTI	0.11			ED INACTIVE BECAUSE	
	je No. Seed ed First Day		roximate) mg/kg	Approx. No. Seed Lethal	_		OORLY ACCEPTED TO	
2	23.4		12	6.1			RGIN OF SAFETY BETWI FEL PRECLUDING USE A	
				-			DENTICIDE DOUBTFUL	DUE TO
COMMENT	TS:12	2 - 3.8 - 1	00		_		CICITY OF COMPOUND	
					отн	HER		
INVESTIG	ATOR:							

TEST NO	. Standa	rd 38				CONCENTRATION 1% wt.
COMPAN	Y CODE	Code	d	DRC		DATE PREP. 2/15/63 DATE TESTED 2/18/63
				Topografic		CARRIER Douglas-fir TEST ANIMAL Peromyscus
ANIMAL	DAILY	ACCEPTA	NCE	OBSERVATION PERIOD	TOTAL	FORMULATION:
NUMBER	1	2	3	4 DAYS	SEED	X - CHEMICAL DISSOLVED IN ACETONE AND APPLIED TO SEED.
1	46/1	36/3	9		91	CHEMICAL DISSOLVED IN WATER AND APPLIED TO SEED.
2	49/1	50	50		149	OTHER
3	50	1	1		52	
4	50	50	140		140	ACTION RECOMMENDED:
5	46/3	19	48		113	COMPOUND IS SUFFICIENTLY ACTIVE TO WARRANT FURTHER
TOTAL	241	156	148		545	TESTING.
			PERCEN	T REDUCTION	27.3	OR COMPOUND IS PLACED INACTIVE BECAUSE:
	ge No. Seed		Approximat	e	Approx. No.	COMPOUND IS A POORLY ACCEPTED TOXICANT
	ed First Day	<u>′ </u>	LD mg/kg		Seed Lethal	- INADEQUATE MARGIN OF SAFETY BETWEEN AVOIDANCE
	8.2		18			AND LETHAL LEYEL PRECLUDING USE AS REPELLENT.
COMMEN	TS:					LI - USE AS FIELD RODENTICIDE DOUBTFUL DUE TO RATHER LOW TOXICITY OF COMPOUND
						OTHER
		•			·	
INVESTIC	SATOR:		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			
					BIOA	SSAY RECORD
					Denver Wild	life Research Center
TEST NO). Standar	:d 40				CONCENTRATION1% wt
COMPAN	Y CODE	Coded		DRC		DATE PREP. <u>2/15/63</u> DATE TESTED <u>2/25/63</u>
	r			In-a	T	CARRIER <u>Douglas-fir</u> TEST ANIMAL Swiss white
ANIMAL	DAILY	ACCEPTA	NCE	OBSERVATION PERIOD	TOTAL	FORMULATION:
NUMBER	1	2	3	4 DAYS	SEED	□ — CHEMICAL DISSOLVED IN ACETONE AND APPLIED TO SEED.
ı	47/3	46/4	40/10		133	CHEMICAL DISSOLVED IN WATER AND APPLIED TO SEED.
2	49/1	34/6	25/5		108	OTHER
3	7/31	1/38	2/4		10	
4	43/7	33/17	44/6		120	ACTION RECOMMENDED:
5	0/3				. 0	COMPOUND IS SUFFICIENTLY ACTIVE TO WARRANT FURTHER
TOTAL	146	114	111		371	TESTING.
			PERCEN	T REDUCTION	42.9	— INSUFFICIENT ACTIVITY TO WARRANT FURTHER TESTING OR COMPOUND IS PLACED INACTIVE BECAUSE:
Averag	je No. Seed		pproximate	e	Approx. No.	- COMPOUND IS A POORLY ACCEPTED TOXICANT
Consum	ed First Day		LD mg/kg		Seed Lethal	- INADEQUATE MARGIN OF SAFETY BETWEEN AVOIDANCE
	29.2		12			AND LETHAL LEVEL PRECLUDING USE AS REPELLENT.
COMMEN.	TS:		· · · · · · · · · · · · · · · · · · ·			L - USE AS FIELD RODENTICIDE DOUBTFUL DUE TO RATHER LOW TOXICITY OF COMPOUND
		· <u> </u>				OTHER

GPO 835-723

TOXICITY RECORD

Denver Wildlife Research Center

CHEMICAL DRC-724* DRC 724 TEST MAMMAL PETOHYBROUS	CHEMICAL DRC-714* DRC 714 TEST MAMMAL Swiss whitemales
FORMULATION DATE 2/25/63 TEST DATE 2/26/63 OBSERVATION PERIOD 2 DAYS	FORMULATION DATE 2/25/63 TEST DATE 2/26/63 OBSERVATION PERIOD 2 DAYS
TYPE OF ADMINISTRATION OTEL APPROXIMATE LD = 18 118 118 1/kg.	TYPE OF ADMINISTRATION OTB1 APPROXIMATE LD = 12 mg /kg.
FORMULATION: 0.10 gram dissolved in acetone, placed into corn oil, acetone	FORMULATION: 0.10 gram dissolved in acetone, placed into corn oil, acetone evaporated;
evaporated; 100 ml. solution prepared.	100 ml. solution prepared.
COMMENTS. 1 mg/ml *2nd sammle received	# # # # # # # # # # # # # # # # # # #

%ê ¥											
Animal No.	3 2	9	7	8	Q.						
									 r		r
TIME OF DEATH	1st overnight period										
Time of Admin.	12:30										
Actual Dosage (ml)	64.0	0.30	0.22	0.15	0.11						
Dosage Nor mg/kg	18	ผ	8	5•5	3.7						
Sex and Weight	M 27	M 25	M 27	M 27	62			,			
Animal No.	C 10	7	12	13	1,4				:		

Method employed as described by Wm. Deichman and T. LeBlanc in the Journal of Industrial Hygiene and Toxicology, Vol. 25, No. 9, pp. 415-417.

Investigator_

TOXICITY RECORD

Denver Wildlife Research Center

ТІМЕ ОГ DEATH	1st overnight period	2nd overmight period									
Time of Admin.	12:30										
Actual Dosage (ml)	0.43	98.0	.°°	0.13	0.09						
Dosage Nor mg/kg	18	12	8	5.5	3.7						
Sex and Weight	25	R	8	켮	25						
Animal No.	c 5	9	7	8	ę,						
ГΤ									 		
								i			

Method employed as described by Wm. Deichman and T. LeBlanc in the Journal of Industrial Hygiene and Toxicology, Vol. 25, No. 9, pp. 415-417.

Investigator

GPO 835-723

SEED PHYTOTOXICITY RECORD

CHEMICAL	DRC-71	<u>4</u>	IOASSAY R	EFERENCE	Stan.	<u>37&39</u> DATE I	PREPARED_	<u> 2/15/63</u>			
SEED	Wheat	_DATE PLA	ANTED 2	/20/63	СНЕМ	IICAL CONCEN	TRATION	1% wt.			
SEED COND	TA NOITI	TIME OF TR	EATMENT:		Unstratified <u>*</u> ; Stratified						
FORMULAT	ION:										
X	CHEMICA	L DISSOLV	ED IN ACET	ONE AND A	PPLIED	TO SEED.					
	CHEMICA	L SUSPEND	ED IN ADH	ESIVE AND	APPLIE	D TO SEED.					
	OTHER_		.,*				•				
			GE	RMINATION	I RESUL	_TS					
						-1.0					
DATE	2/25	2/28	3/4				PLANTED/	GERMINATED			
CONTROL	94	96	96				100/	96			
TREATED	71	88	89				100/	89			
GROWTH RATE AND FORM											
Slight 											
	ı I		ABNORMAL POOT DEVELOPMENT.								
	ı I	_	ABNORMAL FOLIAR COLORATION								
ш	[X]		ABNORMAL FOLIAR COLORATION.								
			SEEDLING APPEARED NORMAL.								
Comm	ents:										
	-										
				tor	· · · · · · · · · · · · · · · · · · ·						

TEST NO	Standa:	rd 70				CONCENTRATION1% wt.
СОЙЬЧИ	Y CODE!	<u> Petrami</u>	ne	DRC		DATE PREP. 8/9/63 DATE TESTED 8/12/63
	<u> </u>			IORSEDVATION!		CARRIER Wheat TEST ANIMAL Peromyscus
ANIMAL	DAILY	ACCEP	TANCE	OBSERVATION PERIOD	TOTAL	FORMULATION:
NUMBER	1	2	3	DAYS	SEED	■ - CHEMICAL DISSOLVED IN ACETONE AND APPLIED TO SEED.
1	5/6				5	CHEMICAL DISSOLVED IN WATER AND APPLIED TO SEED.
2	3/13				3	OTHER
3	1/3	<u> </u>			1	
4	1/6				1.	ACTION RECOMMENDED:
5	1/1				1.	COMPOUND IS SUFFICIENTLY ACTIVE TO WARRANT FURTHER
TOTAL	11				11	TESTING.
			PERCEN	T REDUCTION	91.2	INSUFFICIENT ACTIVITY TO WARRANT FURTHER TESTING OR COMPOUND IS PLACED INACTIVE BECAUSE:
	je No. Seed		Approximat	e /	Approx. No.	COMPOUND IS A POORLY ACCEPTED TOXICANT
Consum	ed First Day	<u>'</u> -	LD mg/kg	<u>.</u>	seed Lethal	- INADEQUATE MARGIN OF SAFETY BETWEEN AVOIDANCE
	2.2		1.6		0.07	AND LETHAL LEVEL PRECLUDING USE AS REPELLENT.
COWNEN.	TS:1.	6 - 31.	4 - 100			USE AS FIELD RODENTICIDE DOUBTFUL DUE TO RATHER LOW TOXICITY OF COMPOUND
						OTHER
INVESTIC	ATOR:					
					BIOA	SSAY RECORD
					Denver Wild	life Research Center
TEST NO	. Standar	rd 49				CONCENTRATION01% wt
COMPAN	Y CODE	[etramin	ne	DRC		DATE PREP. 4/19/63 DATE TESTED 4/22/63
						CARRIER Wheat TEST ANIMAL Peromyscus
ANIMAL	DAIL	ACCEP	TANCE	OBSERVATION PERIOD	TOTAL	FORMULATION:
NUMBER	1	2	3	3_DAY\$	SEED,	□ CHEMICAL DISSOLVED IN ACETONE AND APPLIED TO SEED.
1	2	5	7/1		14	CHEMICAL DISSOLVED IN WATER AND APPLIED TO SEED.
2	5	9			14	
3	6	2			8	
4	16	N. E.			. 16	ACTION RECOMMENDED:
5 .	. 8	2	1		11	COMPOUND IS SUFFICIENTLY ACTIVE TO WARRANT FURTHER
TOTAL	37	1 8	8		63	TESTING.
			PERCEN	IT REDUCTION	77.1	INSUFFICIENT ACTIVITY TO WARRANT FURTHER TESTING OR COMPOUND IS PLACED INACTIVE BECAUSE:
Ayera	ge No. Seed		Approxima	······································	Approx. No.	COMPOUND IS A POORLY ACCEPTED TOXICANT
	ed First Da	<u>y</u> .	LD mg/kg		Seed Lethal	- INADEQUATE MARGIN OF SAFETY BETWEEN AVOIDANCE
	7.4	_ ·.	1.6		6.4	AND LETHAL LEVEL PRECLUDING USE AS REPELLENT.
COMMEN	TS: <u>l.</u>	6 - 1.1	6 - 80			- USE AS FIELD RODENTICIDE DOUBTFUL DUE TO RATHER LOW TOXICITY OF COMPOUND
J			· · · · · · · · · · · · · · · · · · ·			- OTHER
	GATOR:					

Tetramine

BIOASSAY RECORD

IEST NO. Stan							CONCENTRATION	1% wt.
COMPANY CODE	Tetra	mine	DRC		DATE PREP. 8/9/	63	DATE TESTED	8/12/63
			OBSERVATION		CARRIER Whea	t	TEST ANIMAL	Swiss white
 	ILY ACCE	1	PERIOD	TOTAL	FORMULATION:			
NUMBER I	2	3	DAYS	SEED	x - CHEMICAL DI	SSOLVED I	N ACETONE AND APPI	LIED TO SEED.
1 0				0	- CHEMICAL DI	SSOLVED I	N WATER AND APPLIE	D TO SEED.
2 0				0	OTHER			- <u>-</u> -
3 1				1				
4 1				1	ACTION RECOMMEN	DED:		
5 0				0	COMPOUND IS TESTING.	SUFFICIE	NTLY ACTIVE TO WAR	RANT FURTHER
TOTAL 2				2		f ACTIVITY	. TO W. T	
·		PERCEN	IT REDUCTION	98.4	OR COMPOUND	D IS PLACE	TO WARRANT FURTH D INACTIVE BECAUSE	ER TESTING
Average No. Se Consumed First		Approximat		Approx. No.	COMPOU	ND IS A PO	ORLY ACCEPTED TO	CICANT
0.4		LD mg/kg		0.015	- INADEQU AND LET	JATE MARG	IN OF SAFETY BETWEEL PRECLUDING USE A	EEN AVOIDANCE AS REPELLENT.
COMMENTS:	0.5 - 26	.7 - 100			☐- USE AS F RATHER	TIELD ROD	ENTICIDE DOUBTFUL	DUE TO
- ,								
NVESTIGATOR:								
					SAY RECORD ife Research Center			
TEST NO. <u>Stan</u>	dard 50						CONCENTRATION _	0.005% wt.
		ne	DRC	Denver Wildl	ife Research Center	ı/19/63	CONCENTRATION	
COMPANY CODE		ne		Denver Wildl	ife Research Center DATE PREP.			4/22/63
COMPANY CODE			DRCOBSERVATION PERIOD	Denver Wildl	ife Research Center DATE PREP.		DATE TESTED	4/22/63
COMPANY CODE	Tetrami		OBSERVATION	Denver Wildl	DATE PREP	Theat	DATE TESTED	4/22/63 Swiss white
COMPANY CODE	Tetrami	TANCE	OBSERVATION PERIOD	Denver Wildl	DATE PREP	Wheat	DATE TESTED TEST ANIMAL	4/22/63 Swiss white
COMPANY CODE ANIMAL DA NUMBER 1 1 6 2 13/3	Tetrami	TANCE	OBSERVATION PERIOD	Denver Wildl TOTAL SEED	DATE PREP	Meat SSOLVED II	DATE TESTED TEST ANIMAL N ACETONE AND APPLIE	4/22/63 Swiss white
COMPANY CODE ANIMAL DA NUMBER 1 1 6 2 13/3 3 1/2	Tetrami	TANCE	OBSERVATION PERIOD	Denver Wildl TOTAL SEED	DATE PREP. CARRIER FORMULATION: - CHEMICAL DIS	Meat SSOLVED II	DATE TESTED TEST ANIMAL N ACETONE AND APPLIE	4/22/63 Swiss white
COMPANY CODE ANIMAL DA NUMBER 1 1 6 2 13/3	Tetrami ILY ACCEF 2	TANCE	OBSERVATION PERIOD	TOTAL SEED	DATE PREP. CARRIER FORMULATION: - CHEMICAL DIS	SSOLVED II	DATE TESTEDTEST ANIMAL N ACETONE AND APPLIE	4/22/63 Swiss white
ANIMAL DA NUMBER I I 6 2 13/3 3 1/2	Tetrami ILY ACCEF 2	TANCE	OBSERVATION PERIOD	TOTAL SEED 6 13 8	DATE PREP	Theat SSOLVED II SSOLVED II	DATE TESTEDTEST ANIMAL N ACETONE AND APPLIE	4/22/63 Swiss white
COMPANY CODE ANIMAL DA NUMBER 1 1 6 2 13/3 3 1/2 4 5	Tetrami ILY ACCEF 2	TANCE	OBSERVATION PERIOD	TOTAL SEED 6 13 8 7	DATE PREP	SSOLVED II SSOLVED II DED:	TEST ANIMAL TEST ANIMAL A ACETONE AND APPLIE WATER AND APPLIE	4/22/63 Swiss white LIED TO SEED. D TO SEED.
COMPANY CODE ANIMAL DA NUMBER 1 1 6 2 13/3 3 1/2 4 5 5 5	Tetrami ILY ACCEF 2 7 2	TANCE 3	OBSERVATION PERIOD	TOTAL SEED 6 13 8 7 5	DATE PREP	SSOLVED II SSOLVED II DED: SUFFICIEN	DATE TESTEDTEST ANIMAL N ACETONE AND APPLIE	4/22/63 Swiss white LIED TO SEED. D TO SEED. RANT FURTHER ER TESTING
ANIMAL DA NUMBER 1 1 6 2 13/3 3 1/2 4 5 5 5 TOTAL 30 Average No. Se	Tetrami ILY ACCEF 2 7 2 9	PERCEN Approximat	OBSERVATION PERIOD 3_DAYS AT REDUCTION	TOTAL SEED 6 13 8 7 5 39 77-7	DATE PREP	SSOLVED II SSOLVED II DED: SUFFICIEN ACTIVITY DIS PLACE	DATE TESTED TEST ANIMAL N ACETONE AND APPLIE N WATER AND APPLIE	4/22/63 Swiss white LIED TO SEED. D TO SEED. RANT FURTHER ER TESTING
ANIMAL DA NUMBER 1 1 6 2 13/3 3 1/2 4 5 5 5 TOTAL 30 Average No. Se Consumed First	Tetrami ILY ACCEF 2 7 2 9	PERCEN Approximat LD mg/kg	OBSERVATION PERIOD 3_DAYS AT REDUCTION	TOTAL SEED 6 13 8 7 5 39 77-7	DATE PREP	SSOLVED II SSOLVED II DED: SUFFICIEN ACTIVITY D IS PLACE ND IS A PO	DATE TESTED TEST ANIMAL ACETONE AND APPLIE N WATER AND APPLIE TO WARRANT FURTH D INACTIVE BECAUSE ORLY ACCEPTED TOX	4/22/63 Swiss white LIED TO SEED. D TO SEED. RANT FURTHER ER TESTING :: KICANT EEN AVOIDANCE
NUMBER 1 1 6 2 13/3 3 1/2 4 5 5 5 TOTAL 30 Average No. Sec Consumed First	Tetrami ILY ACCEF 2 7 2 9	PERCEN Approximat LD mg/kg	OBSERVATION PERIOD 3_DAYS AT REDUCTION	TOTAL SEED 6 13 8 7 5 39 77-7	DATE PREP	SSOLVED II SSOLVED II DED: SUFFICIEN ACTIVITY D IS PLACE ND IS A PO JATE MARG	TEST ANIMAL TEST ANIMAL A ACETONE AND APPLIE N WATER AND APPLIE TO WARRANT FURTH D INACTIVE BECAUSE ORLY ACCEPTED TOX SIN OF SAFETY BETWE EL PRECLUDING USE A	4/22/63 Swiss white LIED TO SEED. D TO SEED. RANT FURTHER ER TESTING KICANT EEN AVOIDANCE S REPELLENT.
ANIMAL DA NUMBER 1 1 6 2 13/3 3 1/2 4 5 5 5 TOTAL 30 Average No. Se Consumed First	Tetrami ILY ACCEF 2 7 2 9	PERCEN Approximat LD mg/kg	OBSERVATION PERIOD 3_DAYS AT REDUCTION	TOTAL SEED 6 13 8 7 5 39 77-7	DATE PREP	SSOLVED II SSOLVED II SSOLVED II SUFFICIEN ACTIVITY D IS PLACE ND IS A PO JATE MARG THAL LEVE LOW TOXIC	TEST ANIMAL TEST ANIMAL N ACETONE AND APPLIE WATER AND APPLIE TO WARRANT FURTH D INACTIVE BECAUSE ORLY ACCEPTED TOX SIN OF SAFETY BETWEE IL PRECLUDING USE A	4/22/63 Swiss white LIED TO SEED. D TO SEED. RANT FURTHER ER TESTING ER AVOIDANCE SREPELLENT. DUE TO
COMPANY CODE ANIMAL DA NUMBER 1 1 6 2 13/3 3 1/2 4 5 5 5 TOTAL 30 Average No. Sec Consumed First 6.0	Tetrami ILY ACCEF 2 7 2 9	PERCEN Approximat LD mg/kg	OBSERVATION PERIOD 3_DAYS AT REDUCTION	TOTAL SEED 6 13 8 7 5 39 77-7	DATE PREP	SSOLVED II SSOLVED II SSOLVED II SUFFICIEN ACTIVITY D IS PLACE ND IS A PO JATE MARG THAL LEVE LOW TOXIC	TEST ANIMAL TEST ANIMAL A ACETONE AND APPLIE N WATER AND APPLIE TO WARRANT FURTH D INACTIVE BECAUSE ORLY ACCEPTED TOX SIN OF SAFETY BETWE EL PRECLUDING USE A	4/22/63 Swiss white LIED TO SEED. D TO SEED. RANT FURTHER ER TESTING KICANT EEN AVOIDANCE S REPELLENT. DUE TO

TEST NO	. Standar	đ <u>73</u>				CONCENTRATION 1% wt.
COMPANY	CODE	Tetram	ine	DRC		DATE PREP. 8/9/63 DATE TESTED 8/12/63
						CARRIER <u>Douglas-fir</u> TEST ANIMAL <u>Peromyscus</u>
ANIMAL	DAIL	ACCEPT	ANCE	OBSERVATION PERIOD	TOTAL	FORMULATION:
NUMBER	1	2	3	4_DAYS	SEED	□ CHEMICAL DISSOLVED IN ACETONE AND APPLIED TO SEED.
1	35	5/43			40	- CHEMICAL DISSOLVED IN WATER AND APPLIED TO SEED.
2	5	4/8			9	- OTHER
3	20	+/ S			20	
4	47				47	ACTION RECOMMENDED:
5	33/2				33	- COMPOUND IS SUFFICIENTLY ACTIVE TO WARRANT FURTHE
TOTAL	140	9			149	TESTING.
TOTAL	2.70		PERCE	NT REDUCTION	57.	— INSUFFICIENT ACTIVITY TO WARRANT FURTHER TESTING OR COMPOUND IS PLACED INACTIVE BECAUSE:
Averag	e No. Seed		Approximo	ıte	Approx. No.	COMPOUND IS A POORLY ACCEPTED TOXICANT
Consume	28.0	<u>y</u> _	LD mg/k	_	Seed Lethal	- INADEQUATE MARGIN OF SAFETY BETWEEN AVOIDANC AND LETHAL LEVEL PRECLUDING USE AS REPELLENT
COUNENT				<u>-</u>	***************************************	USE AS FIELD RODENTICIDE DOUBTFUL DUE TO RATHER LOW TOXICITY OF COMPOUND
JOMMEN	J		•			- OTHER
				•		
INVESTIG	A I OR:					
TEST NO.	Standa:	rd 71			Denver Wild	life Research Center CONCENTRATION 1% wt.
COMPANY	CODE	Tetrami	ne	_DRC		DATE PREP. 8/9/63 DATE TESTED 8/12/63
						CARRIERDouglas-firTEST_ANIMALSwiss_whit
ANIMAL	DAIL	ACCEPT	ANCE	OBSERVATION PERIOD	TOTAL	FORMULATION:
NUMBER	Į	2;	3	4_DAYS	SEED	▼ - CHEMICAL DISSOLVED IN ACETONE AND APPLIED TO SEED.
1	13/2				13	- CHEMICAL DISSOLVED IN WATER AND APPLIED TO SEED.
2	4/2				4	
3	4/14				1,	
4	6/1.				6	ACTION RECOMMENDED:
5	8/1				8	- COMPOUND IS SUFFICIENTLY ACTIVE TO WARRANT FURTHER
TOTAL	35				35	TESTING.
TOTAL			PERCE	NT REDUCTION	86.0	. — INSUFFICIENT ACTIVITY TO WARRANT FURTHER TESTING OR COMPOUND IS PLACED INACTIVE BECAUSE:
	No. Seed		Approxima		Approx. No.	COMPOUND IS A POORLY ACCEPTED TOXICANT
	d First Day	<u>'</u>	LD mg/k	<u> </u>	Seed Lethal	- INADEQUATE MARGIN OF SAFETY BETWEEN AVOIDANCE AND LETHAL LEVEL PRECLUDING USE AS REPELLENT.
COMMENT	'S:					- USE AS FIELD RODENTICIDE DOUBTFUL DUE TO RATHER LOW TOXICITY OF COMPOUND
						OTHER
NVESTIG.	ATOD:					•
	- I VINI					

Denver Wildlife Research Center TOXICITY RECORD

DAYS ∕kg.

TOXICITY RECORD

Denver Wildlife Research Center

CHEMICAL Tetranine DRC TEST MAMMAL Peromysous	CHEMICAL Tetramine DRC TEST MAMMAL SWiss white
FORMULATION DATE8/19/63 TEST DATE_8/19/63 OBSERVATION PERIOD3_DAYS	FORMULATION DATE 8/19/63 TEST DATE 8/19/63 OBSERVATION PERIOD 3
TYPE OF ADMINISTRATION OTAL APPROXIMATE LD = $1.6 \text{ mg} \cdot \text{ /kg}$.	TYPE OF ADMINISTRATION OT81 APPROXIMATE LD = 0.5 mg.
FORMULATION: Suspension of 0.05 mg. chemical per ml. corn oil	FORMULATION: Suspension of 0.05 mg. per ml. corn oil

COMMENTS:

COMMENTS:

Anima No.	Sex and Weight	Dosage Xormg∕kg	Actual Dosage (ml)	Time of Admin.	TIME OF DEATH	Animal No.	Animal Sex and No. Weight	Dosag Nor mg
4	F 16	3.7	1.18	12:10	1 hour	A 7	8	3.7
α	M 22	2.4	1.06		40 min.	ω	8	1 N
3	M 20	7.6	49.0		2nd overnight period	σ	. Z	7,6
4	F 17	1.0	₽6°0			5	85	0-1
5	F 20	٠.	0.28			Ħ	£ ≥	-
v	7	Ľ	71.0			;	;	

TIME OF DEATH	20 <u>min</u> .	20 min.	1. hour	35 min.	35 min.	1st overnight period						
Time of Admin.	12:15											
Actual Dosage (ml)	1.48	96*0	0.74	0.36	0.32	0.23	0.15					
Dosage Normg/kg	3.7	11°0	1.6	1.0	7.	•5	.33				-	
Sex and Weight	M 20	8	l .	M 18	M 23	M 23	M 23					
Animal No.	A 7	8	6	10	Ħ	71	13					

Method employed as described by Wm. Deichman and T. LeBlanc in the Journal of Industrial Hygiene and Toxicology, Vol. 25, No. 9, pp. 415-417.

Method employed as described by Wm. Deichman and T. LeBlanc in the Journal of Industrial Hygiene and Toxicology, Vol. 25, No. 9, pp. 415-417.

Investigator___

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GPO 835-723

SEED PHYTOTOXICITY RECORD

Denver Wildlife Research Center

CHEMICAL	Tetram	ine B	IOASSAY RE	FERENCE	Stan. 70	DATE F	REPARED_	8/9/63				
SEED	Wheat	_DATE PLA	ANTED 8	/9/63	_CHEMICAL	CONCENT	RATION	1% wt.				
SEED CONDITION AT TIME OF TREATMENT: Unstratified; Stratified;												
FORMULATION:												
x												
. \Box	CHEMICAL DISSOLVED IN ACCIONE AND APPLIED TO SEED. CHEMICAL SUSPENDED IN ADHESIVE AND APPLIED TO SEED.											
ليا	OTHER											
												
GERMINATION RESULTS												
				·		·						
DATE	8/15_	8/19	8/21				PLANTED/	GERMINATED				
CONTROL	91	93	94				100/	^{'94}				
TREATED	86	.88	89				100/	89				
•												
GROWTH RATE AND FORM												
Slight	Pron	ounced —										
			ABNORMAL FOLIAR DEVELOPMENT.									
	-{		ABNORMAL ROOT-DEVELOPMENT.									
ABNORMAL FOLIAR COLORATION.												
SEEDLING APPEARED NORMAL.												
_												
Comments:												
				 								
Investigator												
								20.007.202				

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