



Chevron Chemical Company

CHEVRON CHEMICAL COMPANY
ORTHO DIVISION
RESEARCH AND DEVELOPMENT DEPARTMENT
RICHMOND, CALIFORNIA

LIAISON MEETING-ICI/PPD AND CHEVRON
FEBRUARY 22 and 23, 1977
RICHMOND, CALIFORNIA

Date: APRIL 12, 1977
File No: 721.37/PARAQUA
X. File: DIQUAT

The following are minutes of the bi-annual liaison meeting between ICI/PPD and Chevron. The meetings were held at Chevron R&D facilities in Richmond, California. Participants for ICI/PPD were: A. Calderbank, D. Foulkes, D. Barrett, J. Brauholtz and M. Rose. Participants for Chevron were: B. Quisenberry, J. Abell, B. Witherspoon, Jr., J. Leary, L. Stelzer, J. Whitehead, H. Franke, B. Tucker, J. Ospenson, R. Cavalli.

DIQUAT

Water Weed Petition. In February, 1977, the petition was sent to the Office of General Council. J. Cummings of EPA had written a minority review, as he is unhappy with the lack of a policy on tolerance setting in water. It is anticipated that the petition will be returned to the Registration Division for further review. In the meantime, label and sales continue with the interim tolerance. The Corps of Engineers has submitted a petition which is identical to the Ortho petition. It appears the Corps of Engineers may get clearance, with the stipulation that Diquat could be used only by government agencies.

Potato Petition. A. Calderbank gave H. Franke a report, which was done in the 1960's on the distribution of diquat in boiled potatoes and the cooking water.

The present target date for submission of the petition is late April or early May, 1977.

There is more than enough data to show effective desiccation. For storage, the data has not shown that dry soil causes any more rot than wet soil. Chevron will submit PPD data and use the same label statements as are on the PPD label. The label will state that dry soil conditions can cause rot. In 1976 Chevron had four or five tests under drought stress conditions. Tubers have been in storage since October and will be kept until approximately May. There are cases when rot developed even in the absence of drought stress conditions. In general, Chevron data cannot be used to predict incidence of storage rot.

Residue data is complete, except for processed potatoes. Residue data will also have to be collected on potato chips and potato peels. Chevron will do the processing and analysis in Richmond.

L. Stelzer still feels a 0.2 part per million tolerance is justified. Even though most of the residues are quite low, there are some values as high as 0.08 to 0.09 part per million.

There was general discussion on the potential problem of potato storage rot and lawsuits. Chevron R&D does not feel very positive about the diquat potato harvest aid program. One year of law suits could wipe out all profits.

A. Calderbank reported they have never had a stem-end rot situation in Canada. B. Quisenberry noted that marketing has dictated the type of label they want, and the label is being written to satisfy them. L. Stelzer emphasized that the Chevron data can not support the label statements. The data can not be used to predict what conditions will cause rot. J. Whitehead commented that all chemicals can cause rot and diquat is not any worse than other chemicals, and that Marketing is aware of the risks.

Environmental Impact Report. The majority of the references cited in the environmental impact report are from published journals or books. Therefore, we will have to obtain permission from the copyright owners before we can use them. It was decided that Chevron would obtain permission from the copyright owners for U.S. publications, and PPD will get permission from copyright owners from all other countries. The end of March was set as the deadline for obtaining permissions. At that point we would have to contend with references with copyright permission and finalize the environmental impact report.

Analysis of Diquat and Paraquat Separately In Presence of Both.

PPD has not had much success with the high pressure liquid chromatography procedure from Chevron. There are background problems with potato samples. The difference in background between Chevron and PPD samples could be due to the fact that PPD is refluxing with 1N sulfuric acid, while Chevron refluxes

with 18 N sulfuric acid. A. Calderbank reported a promising gas-liquid chromatography method after reduction of diquat. Some peaks of diquat and paraquat are superimposed, but there is one separate peak for each which can be used for analysis. A. Calderbank gave H. Franke two reports: one on high pressure liquid chromatography and another on gas-liquid chromatography. The gas-liquid chromatography method can probably be the basis for an acceptable method if EPA will accept mass spectroscopy as a detector. For the potato submission the Chevron high pressure liquid chromatography method will probably satisfy EPA. Chevron has already sent A. Calderbank the high pressure liquid chromatograph conditions and paraquat and diquat recoveries with potatoes. B. Tucker gave A. Calderbank the final, written residue method for high pressure liquid chromatography and also RM8-8 and RM5-5.

Alternate Anion. J. Ospenson emphasized that any new use for diquat involving treatment of feed crops for lactating animals could not use the bromide salt. PPD reported that they believe they can manufacture the chloride salt, but it is too early to give costs. J. Ospenson commented that cost is very important in determining future uses for diquat. If the cost of the diquat active goes up, this would also affect marketing cost. Also we need to look at the entire picture very early and consider whether we want to market an emetic and stench formulation. It was also pointed out that we must "bridge" the data on the chloride salt from the bromide salt as regards residue chemistry, environmental chemistry, human safety (toxicology), domestic animal safety and fish/wildlife safety.

Photoproducts. PPD has done more work on identification of diquat photoproducts. A. Calderbank is very optimistic that photoproducts will eventually be identified. The products have been identified in water solution. Diquat is going to TOPPS which is degraded to many things such as glyoxalic acid. They have done no work with plants. J. Ospenson commented on the importance of identifying the photoproducts. If the photoproducts are not identified, the need for the alternate anion and the expansion of diquat markets is questionable. In other parts of the world, diquat has a very restricted label; it is limited to animal feed use or oil seed crop use. After photoproducts are identified, PPD would hope to change label for general use.

Animal Studies.

Mouse Carcinogenicity. A test (76/1LY1/144) recently received from PPD has not been submitted to EPA. L. Stelzer judged the study as very good and will send it to EPA in the potato petition.

Two-year Rat Study. The old study was submitted to EPA some time ago. L. Stelzer commented that the new two-year cataract rat study (CTL/P/253) will go to EPA with the potato petition.

Chicken Feeding Test. A residue and reproduction study has been completed. The in-life report is due from Industrial BioTest the end of February. Residue analyses are in progress, the limit of detection is 0.01 part per million, using GLC after reduction of Diquat. A mallard duck and quail reproduction study were completed last summer.

Residue and Metabolism in a Cow. The PPD report was sent to Chevron recently. This test had been discussed in correspondence between H. Franke and A. Calderbank, and was not discussed further at the meeting. B. Tucker asked about a cow study reported on last year at which time the lab work was completed, but the report had not been written. A. Calderbank reported that this was a cow study with feeding at 10 ppm in the diet for three months. However, only the milk was analyzed, therefore it would not be too helpful.

Re-Entry Problems. L. Stelzer reported that Chevron marketing feels they are losing sales of approximately ten thousand gallons per year because of the label restriction specifying wearing of waterproof clothing when foliage is wet with dew or rain. Therefore, there is an urgency to proceed in getting the label restriction modified. Chevron has a registration program, which will be conducted in Fresno. Alfalfa will be sprayed and "dew" collected for rabbit dermal work. Since the identity of photoproducts is not known, this appears to be the best way to approach the problem. L. Stelzer discussed the registration program, which calls for sampling grass at 0, 1, 2, and 4 days after spraying. There was some discussion about needing a longer interval to get adequate photoproducts. However, PPD has data showing 80% degradation in four days under bright, sunny days in the summer. L. Stelzer felt March in Fresno would be sunny enough. The registration program calls for pooling the dew from 0, 1, 2, and 4 days. There was discussion whether it would not be better to pool the early intervals and then the later intervals. L. Stelzer will discuss the registration program further with F. Kamienski, who designed the test. (Note: protocol changed to sample at 0, 2, 4 and 8 days; the 0 day sample for measurement of initial deposit with animal testing on samples from 2, 4, and 8 days.)

New Opportunities. J. Whitehead commented that rice and wheat were potential diquat markets. Also, grain sorghum could be a potential market if something would prohibit the use of the paraquat. D. Barrett commented that Chevron Marketing estimates for harvest-aid rice and wheat were 100,000 gallons in the fifth year. He emphasized that these are ballpark numbers.

J. Braunholtz was concerned with the volume of business. PPD can not determine the profitability of going to a dichloride product unless they know the market potential. J. Ospenson emphasized that before a development decision can be made Chevron needs to know the cost of the dichloride and the timing of production. Also, photoproducts have to be identified before any U.S. registrations could be obtained on harvest-aid uses. A. Calderbank is very optimistic that the photoproducts can be identified in the next two years.

PPD is sending diquat dichloride to Chevron for 1977 field testing. In 1977 Chevron will conduct three field tests each on rice, grain sorghum and wheat as an exploratory program. A decision point for development would be the end of 1977. Chevron could start registration programs in 1978, but would need to know information on PPD timing of diquat dichloride production, photoproduct identification, etc.

PPD will send Chevron a list of reports they have on diquat residue data on rice.

J. Whitehead commented that there is no potential for diquat in curing alfalfa hay in the U.S. However, if the paraquat petition for alfalfa fails, we could use diquat for weed control in alfalfa.

PARAQUAT

Registration Status: Pending/Planned. L. Stelzer handed out the January, 1977 registration program schedule and the federal status of petitions (Attached). He also handed out the present paraquat label as of October, 1976 (Attached). He discussed the additions to the paraquat label. They included: guar-pre-harvest desiccation; sugar cane-added Texas; sunflower-removed geographical location (pending); barley and wheat changed to pre-plant and pre-emergence; corn-tank mix with AATREX, PRINCEP, AND BLADDEX; grain sorghum-no tillage and post-emergence directed spray; tomatoes, peppers - plastic mulch; pastures-use any time prior to seeding; potatoes - aerial application North Dakota; soy-beans - tank mix Lasso and Sencor; alfalfa, clover - added number of other states; environmental caution of runoff deleted.

There are four petitions presently pending with EPA: field corn, grain sorghum, pasture reseeding and dry beans harvest aid. The most important petition is the grain sorghum. It has the greatest market potential of the four pending petitions. Also, the 1977 market estimates include grain sorghum.

J. Whitehead discussed registration programs in progress in the field: Alfalfa and clover - an extension of the present label adding the rest of the United States plus tank mixes; strawberries - IR4 program which will be added with the tomatoes and peppers already on the label; mint - another IR4 program; miscellaneous vegetable crops - another IR4 program which includes onions, carrots, etc; for preplant use; wheat - an exploratory program to control cheatgrass in wheat.

Classification Status: General/Restricted. L. Stelzer reported Chevron expects paraquat to be in the restricted use class. EPA is scheduled to make an announcement by October, 1977. The law is to restrict the use, not the product. It appears that all air applications will be restricted. The effect on the paraquat market depends on classifications of other herbicides. If paraquat is the only one restricted then there would be a problem. However, if most herbicides are restricted, then it would be less serious.

Naval Stores Project. This is not a major project for Chevron. The estimated submission date to EPA is June, 1977. However, Chevron has not received the data from cooperators and does not know what type of data to expect; i.e., whether there are Red Flags or not. The cooperators are working on timing and mode of treatment plus treatment rates. The beetle problem still exists, however B. Witherspoon does not see it as insurmountable. At present no high

quality applied research is going on. The market potential estimates get smaller every year for this use. J. Ospenson questioned if PPD and Chevron were exchanging results. A. Calderbank commented that PPD is essentially depending on cooperators and it is difficult to get information. No more residue data is being collected. J. Ospenson commented that before Chevron submits a petition in June, 1977 they should review data from PPD.

Book on Paraquat. It was agreed that justification for the book publication still exists. H. Franke has received two chapters, A. Calderbank has two chapters on his desk and six chapters remain to be completed. No completion date was determined. B. Tucker will notify the editor of Residue Reviews that the date at present is open.

Field Results - 1976. J. Whitehead feels Chevron is approaching the end of adding to the paraquat label. There is only one new program underway which is peanuts for a ground crack application. Most of Whiteheads' groups efforts will be spent on technical support to marketing. However, any new pre-emergent herbicide that comes on the market will require a tank mix label addition. Marketing wants to be able to sell paraquat with all new herbicides.

Drift Reduction Studies. Nalcotrol additive was discussed by J. Whitehead. Chevron has done studies with cotton harvest-aid and found that efficacy is not reduced. If good air application techniques are used, Nalcotrol will reduce drift. Chevron has only done tests with cotton harvest aid where a larger drop size would not be a problem. Chevron does not have data on other uses where larger drop size could cause problems. Chevron has compiled a report on how to minimize drift; it essentially includes good air application techniques, i.e. fly straight, have nozzles at 45° angles, don't apply in windy conditions.

PPD commented that Brazil has expressed concern over drift; however PPD is not really doing much work. In South America, PPD would probably look at some new formulations with drift in mind. Glyphosate has no air applications on label at present. No tillage markets are generally all-ground applications, i.e. spray and plant in one trip. B. Quisenberry has presented an idea to marketing that they initiate an incentive program for applicators to reduce drift.

High Rate Soil Trials. PPD are continuing their trials at the Frensham and Broadricks sites, plus trials in Japan and Western Australia. At the Frensham site some ecological trials are planned, cereals will be planted in 1977, and in further years grass will be maintained. Grass will be maintained at the Broadricks trial and residue samples taken periodically. The South African site has been abandoned. Chevron will maintain their Fresno and Moorestown sites with soil samples being taken annually. PPD has pot trials with both paraquat and diquat, where the soil was treated below and above the strongly bound capacity. They have used both cold and C-14 materials and will look for degradation of unbound paraquat or diquat. Last year D. Riley and B. Tucker discussed working on a standardized procedure to determine soil capacities for paraquat. At the present time Chevron and PPD are not interested in doing any work on such a procedure. No work will be done.

EPA - Good Laboratory Practices. A. Calderbank was interested in how Chevron was handling residue and metabolism data. Chevron are essentially continuing as in the past. Raw data such as autoradiograms and gas chromatograms are indexed and kept in separate binders. Computer printouts are attached to pre-numbered notebook pages. When notebooks and raw data books are no longer needed in the laboratory for reference, they are sent to central files for storage.

A. Calderbank discussed the need for an auditor to check progress and procedures. J. Ospenson commented that for toxicology studies Chevron has set up an auditing committee. For contract residue work, periodic visits are made to the laboratories.

U.S. Paraquat - Bayport Plant. Discrepancies over reported freezing point of the 3 lb./gal. product have been solved. Paraquat can be transported without provision for heating of containers. The stenching agent will be added by Chevron. L. Stelzer reported that there will be no legal problem in transporting the three pound per gallon without an EPA registered label from the production plant to Chevron plants.

D. Barrett commented that PPD would be using some of the paraquat from the Bayport plant for export. He can foresee some problems of paraquat crossing the United States. His concern was responsibility for spillage, environmental or health problems. In the U.S. a national program is in existence called CHEMTREC. CHEMTREC handles all spillage problems, regardless of the company involved. For the medical aspects, D. Cavalli reported that he has been in contact with the assistant medical director of ICI U.S. and they have agreed on a procedure. ICI will leave a backup phone number with CHEMTREC. CHEMTREC has an information file on paraquat.

D. Barrett will confer with H. Franke to learn more about CHEMTREC and obtain Chevron's emergency spill information.

Taiwanese Paraquat - Information on Impurities. A. Calderbank reported that terpyridyls are found in the part per million range in the Taiwanese paraquat. These are very toxic materials. PPD has also developed a "fingerprint" chromatographic system to show impurities present in the various Taiwanese paraquats. This will allow tracing any paraquat to its manufacturing source. Chevron and PPD will hold the information concerning impurities in Taiwanese paraquat until someone tries to register the material.

J. Ospenson reported that he has recently found information that OHTSUKA CHEMICAL COMPANY is selling paraquat in Japan under the name of "Parajet" for industrial uses. Also OHTSUKA has contracted long-range toxicology work in the United States. The estimated cost of the toxicology work committed is approximately \$400,000. This should be sufficient for registration in the U.S.. J. Ospenson does not know if they are working with paraquat dimethyl sulfate and whether its origin is Taiwan. OHTSUKA does not have a U.S. marketing

group, so they could be cooperating with a U.S. company. J. Braunholtz requested a sample if Chevron could obtain it.

Any company could easily obtain a U.S. registration of paraquat with only toxicology studies plus a few efficacy and residue tests. They could possibly have a registration and sales in 1981 or 1982. ICI paraquat use patents run out approximately 1980.

Dimethyl Sulfate - Registration/Deregistration. L. Stelzer reported that the paraquat dimethyl sulfate which is used in garden and home Spot Weed & Grass Killer, has now been used up except for a few drums. Chevron tried to register paraquat dichloride, but EPA rejected the application; no new product registrations can be processed while EPA is considering the RPAR. Chevron now has the problem of running out of paraquat dimethyl sulfate and not having paraquat dichloride registered. D. Barrett is presently looking for available paraquat dimethyl sulfate for Chevron. PPD does not presently manufacture paraquat dimethyl sulfate and does not plan to in the future.

Adequacy of Long Term Toxicology Studies. The mouse carcinogenetic II study was submitted to EPA and it was returned due to deficiencies. It lacked raw data. ICI did the test in the 1960's and it is impossible to go back and get the raw data. ICI plans to repeat the test starting in July. Protocols will be sent to R. Cavalli and Chevron for approval. H. Franke suggested the protocols also be discussed with EPA. Present EPA policy is to grant no new registrations without both mouse and rat studies. Therefore, this will be the rate determining step for our registrations unless there is an EPA policy change. The mouse is considered the second species while the rat is considered the first species.

The rat three-generation reproduction study was rejected by EPA in December, 1976. M. Rose did the test in approximately 1972. He is presently checking to see if he has the required raw data.

A rat two-year study was done by Industrial BioTest. R. Cavalli and M. Rose both agree the study is unsatisfactory. ICI is presently having a Bulgarian study translated to determine if it is satisfactory. However, this is a published journal article, therefore there would be no raw data, making it deficient for EPA submission. It was concluded that a new mouse and two new rat studies may be required. Chevron will review all toxicology reports and evaluate them by present standards. It is important to assure that all necessary toxicology tests are repeated as soon as possible to minimize any delay in registrations.

Status RPAR. L. Stelzer reported that March 15th is the deadline for the EPA announcement. Chevron heard a rumor that EPA will request they send "everything" on file on paraquat. EPA has already contacted Chevron to send anything concerning significant "adverse effects" of paraquat. In Chevron's opinion everything had been sent that was pertinent. The official sources in EPA stated Chevron has submitted enough information to satisfy questions on the antidote problem. However, other reasons for a possible RPAR could be use and accident history, such as drift problems. B. Quisenberry and J. Whitehead feel that

paraquat has more of a drift problem than other herbicides. It always leaves a "calling card." However, Chevron heard that the USDA were told not to prepare a benefits package because OSPR are not going to issue a RPAR against paraquat.

Emetic, Chevron will submit a request for an exemption from tolerance as an inert. They propose to submit at twice the expected concentration, i.e. 0.1% emetic. Chevron now has all the documents required from PPD for the EPA submission. It should be ready to submit to EPA in approximately two weeks. Chevron will only ask for the emetic with paraquat dichloride and not with paraquat dimethyl sulfate.

D. Foulkes reported that the emetic formulation is being handled as a confidential company matter. However, the patents become public information in October, 1977.

M. Rose is preparing a new medical booklet concerning symptoms with the emetic formulation. He believes in general the signs and symptoms will be the same with or without the emetic.

To monitor the effectiveness of the emetic formulation, PPD will use Western Samoa. It has a high usage and high suicide rate. Also, they can effectively remove "old" paraquat and replace it with the new paraquat emetic formulation.

L. Stelzer reported that a registration program has been drafted for the emetic formulation, which includes efficacy, residue, storage stability and animal feed acceptability studies. If the exemption from tolerance fails, the registration program will have to be revised. Field work will not include cooperators. The target date for completion is July, 1978. Chevron would proceed with the registration program even if the exemption from tolerance is acceptable to EPA. Assurance is needed that no problems will exist in efficacy, residue, storage stability or animal acceptance.

F. Kamienski commented that an exemption from tolerance requires an 18-month mouse oncogenic study, a two year rat study and a three-generation rat study. M. Rose reported that PPD has completed an 18-month mouse carcinogenicity test, which should be on his desk when he returns to England. He will send the report to Chevron immediately for inclusion in the EPA submission. F. Kamienski feels that the Ames study report is not written in enough detail to satisfy EPA. However, if we have the 18-month mouse carcinogenicity test, the Ames study report will not be a problem.

- PPD reported that the oral LD50 in dogs of paraquat plus emetic is much greater than paraquat alone. The oral LD50 of the emetic alone, in a vomiting species is so high that it can not be measured.

J. Ospenson questioned whether we want to register diquat with the emetic.

M. Rose commented that the diquat symptoms differ from paraquat. Diquat affects the gut, and possibly the emetic would enhance the diquat toxicity. J. Braunholtz suggested that M. Rose do some quick studies to see if the emetic would soften diquat effects. At present the intent is not to add the emetic to diquat.

D. Foulkes gave J. Abell stability data for the paraquat emetic formulation for up to nine months.

PPD reported that at present the best procedure for preparing the emetic formulation appears to be making a slurry of the emetic then adding it to the paraquat solution. They still have to find an appropriate solvent. The procedure for the addition will be finalized by PPD by March, 1977. Chevron will have to add the emetic themselves for their 1977 field trials. J. Abell will set up stability tests with material prepared for field testing.

Stenched Formulation. The 1% valeric acid formulation was registered with EPA December, 1976. It will be introduced into the U.S. product when the Bayport plant comes on stream.

Review of Previous Day's Separate Toxicological Discussion. R. Cavalli commented that human results and rat results are not completely similar. He also reviewed several human incidents with paraquat. He also reported that it has been concluded to be impractical to find a group of people to study for paraquat effects. Possibly we will have to do a chronic rat inhalation study. The U.S. seems to be the only place where worker exposure has created problems. He feels that we are weak on sub-acute lung damage.

M. Rose reported that his plans for new mode of action work include initiating studies on dermal exposure. Also, he gave the toxicology chapter for the paraquat book to R. Cavalli for review.

B.V. TUCKER

Distribution:

B. Quisenberry
J. Abell
B. Witherspoon, Jr.
J. Leary
L. Stelzer
J. Whitehead
H. Franke
J. Ospenson
R. Cavalli
A. Calderbank for ICI/PPD

REGISTRATIONS PENDING - JANUARY, 1977

PAGE 1

COMMERCIAL PRODUCTS

CHANGES IN EXISTING PRODUCTS	ORIGINAL SUB- MISSION DATES	LAST CORRE- SPONDENCE DATE	CHANGE INVOLVED	COMMENTS
Chevron Weed Killer Concentrate "D"	12/29/76	1/21/77	Revised statement of composition.	EPA 1/21 requested label revi- sions and confidential state- ment of formula.
ORTHO Reglone	12/29/76	1/27/77	Revised statement of composition.	EPA had no objection to the change but requested confidential statement of formula.
ORTHO Weed Killer "D"	12/28/76	1/18/77	Revised statement of composition.	EPA requested clarification of formula 1/18/77.
Paraquat CL	11/24/75 5/25/76 11/9/76	10/22/76 11/26/76	Adding grazing restriction to field corn harvest aid recommendation. Removal of geographical restriction for sun- flowers. Remove varietal restric- tion from hops claim.	See petition. Finished label submitted 10/19/76. EPA acknowledged receipt 10/22/76. EPA acknowledged receipt 11/26/76.

GARDEN & HOME

NEW PRODUCTS	ORIGINAL SUB- MISSION DATES	LAST CORRE- SPONDENCE DATE	COMMENTS
Spot Weed & Grass Control	9/21/76	11/24/76	To convert product to Paraquat dichloride. EPA acknowledged receipt 9/28/76. EPA returned our application 11/24/76 be- cause Paraquat is candidate for RPAR.

CLASSIFIED

REGISTRATION PROGRAM STATUS REPORT

Page No. 2

JANUARY, 1977

* Type of Submission: LRA (Label registration amendment); TTP (Temp. Tol. Petition); TP (Tol. Petition); EUP (Experimental Use Permit)

Product & Formulation Crop or Use	Prog. & BOP No.	Program Objective	* Type of Submission	Date of Submission	Status and Comments on Progress of Program and Ability to Meet Deadline Dates
Diquat 2 Spray - Potato Harvest Aid.	P-67 B18-74	To obtain residue tolerance and label.	TP	3/77	EPA letter of 9/10/76 specifies data required to obtain registration.
Diquat Water Weed Killer	R-61	To obtain tolerance for water and label.	TP	12/18/70	Revised label sent to EPA 6/30/75.
Paraquat CL - Harvest Aid - Dry Beans	P-69 B19-74	To obtain residue tolerance and label	TP & LRA	1/14/77	RPAR status of paraqu may delay approval.
Paraquat CL - Resin Soaking in Pines	P-72	To continue testing under EUP and obtain label.	LRA	1977	EPA extended permit to 3/28/77: EUP extension will be necessary for subsequent applications.
Paraquat CL - Alfalfa and Clover - Dormant Use	R-52 B7-73& B39-76	To add tank mixes. To add dormant use in East.	LRA LRA	2/77 8/77	Submit if residues under 5 ppm.
Paraquat CL - Strawberries - Directed Sprays	R-56 B22-74	To obtain residue tolerance for strawberries and label	TP (IR-4)	8/76	TP submitted by IR-4; program expanded to obtain a national label.

CUSA-00420110

CLASSIFIED

STATUS OF FEDERAL RESIDUE TOLERANCE PETITIONS - NO. 137

JANUARY, 1977

PAGE 2

PRODUCT	USE/COMMODITY	PETITION NUMBER	DATE OF SUBMISSION	ESTIMATED DATE OF ISSUE	REMARKS
Paraquat	Field Corn	5F1625	4/28/75	* The RPAR status of paraquat may influence setting tolerances & approving labels.	Petition amended 12/2/75. Petition amendment sent to EPA 10/27/76. Petition considered amended as of 9/17/76 by EPA.
	Grain Sorghum - Harvest Aid	5F1591 6H5120	1/27/75		
	Pasture Reseeding	5F1639	5/30/75		
	* Dry Beans-Harvest Aid		* 1/14/77		
Diquat	Water	1F1101 FAP3H5022	12/18/70 10/10/70		Petition and revised label under EPA review.

* Denotes changes since last report.

CLASSIFIED

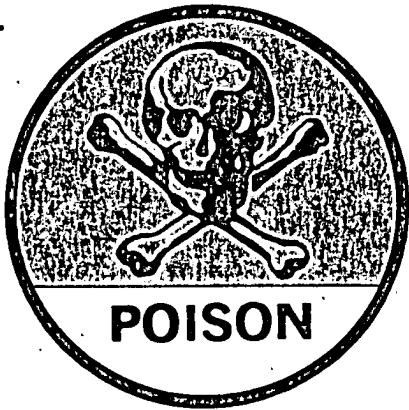
REGISTRATION PROGRAM STATUS REPORT

Page No. 3

JANUARY 1977

* Type of Submission: LRA (label registration amendment); TTP (Temp. Tol. Petition); TP (Tol. Petition); EUP (Experimental Use Permit)

Product & Formulation Crop or Use	Prog. & BOP No.	Program Objective	* Type of Submission	Date of Submission	Status and Comments on Progress, of Program and Ability to Meet Deadline Dates
Paraquat CL - Mint	R-78 B35-75	Weed suppression in dormant, mint.	TP(IR-4) LRA	9/77	
Paraquat CL - Misc. Vegetable Crops	R-82 (M-142)	To register on various minor acreage crops.	TP(IR-4)	9/78	
Paraquat CL - Wheat(Broadcast)	R-94	Air label in Northwest	EUP; LRA	1978/1979	TTP & TP may prove to be needed depending on EUP data obtained.



Current Label
LRS Handout

POISON

**DO NOT POUR
FROM ORIGINAL CONTAINER
EXCEPT FOR IMMEDIATE USE.
ONE SWALLOW CAN KILL!**



ORTHO Paraquat CL

**SUPPLEMENTAL PAMPHLET
DIRECTIONS FOR USE. READ WORKER SAFETY RULES ON BACK PANEL
TO PREVENT ACCIDENTS, NEVER PUT INTO FOOD,
DRINK OR OTHER CONTAINERS.**

**DO NOT USE OR STORE IN OR AROUND THE HOME
KEEP OUT OF REACH OF CHILDREN**

A Weed and Grass Killer · Harvest Aid Chemical.

Active Ingredient	By Wt.
Paraquat dichloride (1,1'-dimethyl-4,4'-bipyridinium dichloride)	29.1%
Inert Ingredients	70.9%
Contains 2 lbs. Paraquat cation per gallon. U.S. Pat. No. 2,972,528	



**DANGER
CAN KILL IF SWALLOWED
HARMFUL TO THE EYES AND SKIN**

FIRST AID TREATMENT

IF SWALLOWED

Immediately induce vomiting by inserting finger in throat. Administer fluids and induce further vomiting. Get to a hospital or physician fast. **PROMPT TREATMENT IS ESSENTIAL.** Symptoms of injury may be delayed.

SKIN CONTAMINATION

In case of contact, wash immediately with water. Remove clothing and wash skin where necessary. Prolonged contact will cause severe irritation. Repeated contact may increase danger of absorption.

EYE CONTAMINATION

In case of contact, wash thoroughly with water and get medical attention.

INHALATION

DO NOT BREATHE SPRAY MIST.

Exposure to spray mist may cause irritation and nose bleeds. Stop and check spray procedure.

Note to Physicians: Emergency Information—call (415) 233-3737.

WASH AND DESTROY CONTAINER WHEN EMPTY. NEVER REUSE.

READ ENTIRE LABEL. USE STRICTLY IN ACCORDANCE WITH DANGER STATEMENTS AND DIRECTIONS, AND WITH APPLICABLE STATE AND FEDERAL REGULATIONS.

READ DANGER AND FIRST AID TREATMENT ON FRONT PANEL AND WORKER SAFETY RULES ON BACK OF PAMPHLET.

NOTE: Do Not Use Around Home Gardens, Schools, Recreational Parks or Playgrounds.

Do not combine ORTHO Paraquat CL with liquid fertilizer solutions except as specified below. **DO NOT** combine with suspension type liquid fertilizers as the activity of Paraquat will be reduced.

DIRECTIONS

ORCHARDS, VINEYARDS, WINDBREAK, SHADE AND ORNAMENTAL TREES: For kill of annual broadleaf weeds and grasses and for top kill and suppression of perennials and green suckers under Filbert trees, in the interspaces and around the base of trees and vines—Almonds, Apples, Apricots, Avocados, Bananas, Cherries, Citrus, Coffee, Figs, Filberts, Grapes, Macadamia Nuts, Nectarines, Olives, Papayas, Peaches, Pears, Pecans, Plums, Prunes, Walnuts and other Trees such as Arborvitae, Ash, Elm, Fir, Oak and Pine—Apply as a directed spray at 1 to 2 qts. per sprayed acre in 50 to 200 gals. water (use 30 to 50 gals. water for pecans) to thoroughly cover the weeds and grasses. Add ORTHO X-77 Spreader (non-ionic) at 8 oz. per 100 gals. Apply when the weeds and grasses are succulent and the new growth is from 1 to 6 inches high. For mature woody weeds, green suckers, late germinating weeds and grasses, and for perennials—retreatment or spot treatment may be necessary. **CAUTION:** Do not allow spray to contact green stems, fruit or foliage as injury may result. Do not spray under windy conditions and use a shield for young trees or vines. Do not allow animals to graze on treated areas. Do not apply when nuts to be harvested are on the ground.

APPLES, PEACHES, PEARS: Tank Mix with PRINCEP® 80W Simazine Weed Killer—For Top Kill and Residual Control of Annual Broadleaf Weeds and Grasses and For Suppression of Perennial Weeds—For broadcast application apply 1 to 2 qts. ORTHO Paraquat CL per acre and 2½ to 5 lbs. PRINCEP 80W per acre for apple and pear orchards or 2 to 5 lbs. PRINCEP 80W for peach orchards. Use the low rate on coarse textured soils and low organic matter soils. Use the high rate on fine textured soils and high organic matter soils. Apply as a tank mix in 50 to 200 gals. of water per acre to the orchard floor avoiding contact with fruit, foliage or stems. Add ORTHO X-77 Spreader (non-ionic) at 8 fl. oz. per 100 gals. diluted spray. Apply when the weeds and grasses are succulent and the new growth is from 1 to 6 inches tall.

For band applications or spot applications around trees, reduce the broadcast rate and the amount of water in proportion to the area actually sprayed.

Do not apply to peaches on sandy or gravelly soils. Use on peaches only in Arkansas, Louisiana, Missouri, Oklahoma, Texas and states east of the Mississippi River.

Make only one application per year. Apply only in orchards where trees have been established one year or more. Do not spray under windy conditions and use a shield for young trees. Do not allow animals to graze treated areas.

Refer to the PRINCEP 80W Simazine label for general information, caution and warning statements.

PRINCEP™ trademark of CIBA-GEIGY for simazine herbicide

HOPS (Cascade, Yakima Cluster and Bullion Varieties Only in Washington, Oregon and Idaho Only): For Kill of Annual Bluegrass, Ryegrass, Barnyardgrass, Pigweed and Chickweed—Apply as a directed spray in the interspaces and around the base of hop plantings using 1 qt. in 20 to 100 gals. water per acre to thoroughly cover weeds and grasses. Add ORTHO X-77 Spreader (non-ionic) at 8 fl. oz. per 100 gals. spray mix. Do not apply around hop vines less than 10 ft. tall. Apply when weeds and grasses are succulent and growth is from 1 to 6 inches tall. Retreatment or spot treatment may be necessary. **For Suckering and Stripping**—Spray only basal 2 ft. of vines using 1 qt. in 20 to 100 gals. water per acre. Add ORTHO X-77 Spreader (non-ionic) at 8 fl. oz. per

100 gals. spray mix. Do not apply to hop vines less than 10 ft. tall. Repeat as necessary. **CAUTION:** Do not apply more than 3 times per season. Do not apply within 14 days of harvest. Do not allow spray to contact green stems, foliage, flowers or cones, as injury may result. Do not allow animals to graze in treated hopyards. Hop vine refuse and silage may be fed to livestock.

GUAVA—Apply as directed spray at 2 qts. per sprayed acre in 50 to 200 gals. to thoroughly cover the weeds and grasses. Add ORTHO X-77 Spreader (non-ionic) at 8 oz. per 100 gals. Apply when the weeds and grasses are succulent and the new growth is from 1 to 6 inches high. For mature woody weeds, late germinating weeds and grasses and for perennials—retreatment or spot treatment may be necessary. **CAUTION:** Do not allow spray to contact green stems, fruit or foliage as injury may result. Do not spray under windy conditions and use a shield for young trees. Do not allow animals to graze on treated areas.

PASSION FRUIT—Apply as a directed spray at 2 qts. per sprayed acre in 50 to 200 gals. to thoroughly cover the weeds and grasses. Add ORTHO X-77 Spreader (non-ionic) at 8 oz. per 100 gals. Apply when the weeds and grasses are succulent and the new growth is from 1 to 6 inches high. For mature woody weeds, late germinating weeds and grasses and for perennials—retreatment or spot treatment may be necessary. **CAUTION:** Do not allow spray to contact green stems, fruit or foliage as injury may result. Do not spray under windy conditions and use a shield for young vines. If bark is still green, wrap vine prior to application to prevent injury. If application is to be made during harvesting season, apply Paraquat only after picking fruits off the ground. Do not allow animals to graze on treated areas.

PINEAPPLES: For Kill of Annual Broadleaf Weeds and Grasses and Top Kill and Suppression of Perennials—Apply as a directed spray using 1 to 2 qts. in 100 to 200 gals. water per sprayed acre to thoroughly cover the weeds and grasses. Add ORTHO X-77 Spreader (non-ionic) at 8 oz. per 100 gals. Apply when weeds and grasses are succulent and new growth is from 1 to 6 inches high. Retreatment may be necessary on more mature weeds. Do not apply within 20 days of harvest.

SMALL FRUITS (Blackberries, Boysenberries, Raspberries, Blueberries)—For Kill of Annual Broadleaf Weeds and Grasses and for Top Kill and Suppression of Perennial Weeds in the Interspaces and Around the Base of Bushes—Apply as a coarse directed spray at 1 to 2 qts. per sprayed acre in 50 to 200 gals. water to thoroughly wet the weeds and grasses. Add ORTHO X-77 Spreader (non-ionic) at 8 oz. per 100 gals. water. Apply before emergence of new canes or shoots as injury to those canes or shoots can result. Apply as a coarse spray to avoid drift injury from fine spray mist.

COTTON HARVEST AID

TO AID IN OPENING OF MATURE BOLLS AND TO DESICCATE GREEN LEAVES: ½ pt. in combination with 1 pt. of phosphate or 1 gal. of chlorate defoliant per acre. Apply when 80% or more of the bolls are open and the remaining bolls to be harvested are mature. Development of immature bolls will be inhibited.

TO AID IN DEFOLIATION AND OPENING OF MATURE BOLLS OF WESTERN COTTON (New Mexico, Arizona, California): ½ pt. in combination with 1 pt. of phosphate or 1 gal. of chlorate defoliant per acre. Apply when 60% or more of the bolls are open and the remaining bolls to be harvested are mature. Development of immature bolls will be inhibited.

TO DESICCATE STRIPPER COTTON: 1 to 2 pts. per acre. When foliage is dense, use 2 applications of 1 pt. if necessary. Apply when 85% or more of the bolls are open and the remaining bolls to be harvested are mature. Development of immature bolls will be inhibited.

AERIAL APPLICATION—Apply 3 to 10 gals. spray mix per acre. Do not apply during periods of thermal inversion to avoid drift.

GROUND APPLICATION—Apply 10 to 30 gals. spray mix per acre. Arrange nozzles to provide thorough coverage of the foliage. Use ORTHO X-77 Spreader (non-ionic) at 1 pt. per 100 gals. spray mix.

May apply as split application. Do not pasture lactating dairy animals. Do not pasture livestock in treated fields within 15 days after treatment. Remove livestock from treated area 30 days before slaughter. Do not feed gin trash to livestock. Do not apply to cotton within 3 days before harvest. Repeat application if necessary. Do not make more than 2 applications or exceed a total of 2 pts. per acre. When combined with phosphate defoliants, observe livestock cautions listed on the phosphate label. When combined with chlorate defoliants, do not pasture livestock on treated areas or feed treated foliage or gin trash. Do not apply within 7 days when used with phosphate or chlorate defoliant.

GUAR—For Use as a Preharvest Crop Desiccant—Apply 1 qt. in 20 to 30 gals. of water per acre. Add ORTHO X-77 Spreader (non-ionic) at 1 to 2 qts. per 100 gals. water. Apply after pods are fully matured. Do not harvest until at least 4 days after application. Do not graze treated areas or feed treated forage to livestock.

POTATO VINES: PREHARVEST VINE KILLING—1 to 2 pts. per acre. Use the 2 pt. rate where vine growth is vigorous or where quick vine kill is desired or 2 applications of 1 pt. when vine growth is dense. Use the 1 pt. rate on maturing vines. Apply in 50 to 100 gals. water per acre with thorough coverage. Add 8 oz. of ORTHO X-77 Spreader (non-ionic) per 100 gals. water. Do not make more than 2 applications with a minimum of 5 days between applications. Do not apply Paraquat to potatoes within 3 days before harvest. Do not pasture livestock in treated potato fields. To avoid injury to subsequent crops, do not use on muck or peat soils.

Do not use Paraquat for desiccating potato vines when the potatoes are to be stored or used for seed as this use may result in tuber decomposition and failure of seed pieces to germinate and grow normally.

SOYBEAN HARVEST AID—Apply ½ to 1 pt. per acre on Broadleaf Weeds and Grasses. Use high rate on Cocklebur. Add 1 qt. ORTHO X-77 Spreader (non-ionic) per 100 gals. spray. **Aerial Application**—2 to 5 gals. spray per acre. **Ground Application**—20 to 40 gals. spray per acre. Apply when soybean plants are mature, i.e., beans are fully developed, at least ½ of leaves have dropped, and leaves left on plants are turning yellow. Immature soybeans will be injured. Mature cockleburs, especially drought-stressed plants, are tolerant to Paraquat and desiccation will not be complete.

Do not pasture livestock within 15 days of treatment. Remove livestock from treated fields at least 30 days before slaughter.

SUGARCANE (Florida Only)—Directed Spray: For Kill of Emerged Annual Broadleaf Weeds and Grasses and for Top Kill of Perennials—Use 1 qt. in 50 to 100 gals. of water per acre. Add ORTHO X-77 Spreader (non-ionic) at 8 oz. per 100 gals. water. Apply as a shielded or directed spray when weeds are 2 to 6 inches high. Avoid contact with cane foliage to prevent serious leaf burn and reduced yields. Make a second and final application if necessary when new weed growth is 2 to 6 inches high. Note: In Florida, for optimum results apply early in the season (March-April) when weeds are small. Repeat application in 4 to 8 weeks when new weeds have emerged. Do not apply after June 1 as cane growth may be stunted and yields reduced.

Preharvest Crop Desiccation (Florida and Texas Only)—Apply ½ to 1 pt. per acre. Apply to mature plant or stubble cane using 4 to 10 gals. water per acre. Use higher rate under cool, cloudy weather conditions. ORTHO X-77 Spreader (non-ionic) should be added to all sprays at the rate of 1 pt. per 100 gals. water. Apply with aircraft sprayer 3 to 14 days before burning and harvest. For rapid results, apply when weather is clear and warm. Apply as a coarse spray at low pressure when air is calm to prevent spray drift.

SUNFLOWER (OILSEED VARIETIES ONLY)—For Desiccation of Sunflower Plants and Broadleaf Weeds and Grasses to Facilitate Harvesting—(Minnesota, South Dakota, North Dakota, Iowa only): Apply 1 to 2 pts. ORTHO Paraquat CL per acre in 5 gals. spray mix by air or in 20 to 40 gals. by ground application equipment. Use the higher rate when crop stands or weed infestations are heavy. Apply when the sunflower seeds reach physiological maturity (when

the heads are yellow and bracts are turning brown) and harvest 7 to 21 days after application. Add ORTHO X-77 Spreader (non-ionic) at 1 qt. per 100 gals. water. Do not graze treated areas or feed treated forage to livestock.

PREPLANT OR PREEMERGENCE USE—For Kill of Emerged Annual Broadleaf Weeds and Grasses and for Top Kill and Suppression of Perennials—Apply when the weeds and grasses are succulent and growth is from 1" to 6" high (larger plants are less affected by this treatment). Note: To prevent injury to germinating crop seedlings, do not apply preplant or preemergence to soils lacking clay minerals, i.e., peat, muck, pure sand, artificial planting media.

ASPARAGUS: Preplant or Preemergence—Apply 1 to 2 qts. per sprayed acre as a band treatment over the row or as a broadcast treatment prior to, during, or after planting, but before emergence of the crop. Add ORTHO X-77 Spreader (non-ionic) at 8 oz. per 100 gals. spray. Apply 50 to 100 gals. spray per acre. Allow maximum weed and grass emergence prior to treatment. Seeding or transplanting should be done with a minimum of soil disturbance. Weeds and grasses emerging after treatment will not be controlled. Crop plants emerged at time of application will be injured. Do not apply within 18 months before harvest.

COTTON: Preplant Treatment—Ground Application: Apply 1 to 2 qts. per acre as a single broadcast application in 20 to 60 gals. water. Beds should be preformed to permit maximum weed and grass emergence prior to treatment. Seeding should be done with a minimum amount of soil disturbance. Weeds and grasses emerging after application will not be controlled. Add ORTHO X-77 Spreader (non-ionic) at 8 oz. per 100 gals. spray.

CORN, LETTUCE, MELONS, PEPPERS, SAFFLOWER (California Only), SOYBEANS, SORGHUM, SUGAR BEETS, TOMATOES: Preplant or Preemergence Treatment—Apply 1 to 2 qts. per sprayed acre as a band treatment over the crop row, or as a broadcast treatment, prior to, during or after planting—but before emergence of the crop. **Aerial Application**—5 to 10 gals. water per acre. **Ground Application**—Use 20 to 60 gals. diluted spray. Add ORTHO X-77 Spreader (non-ionic) at 8 oz. per 100 gals. of diluted spray. Seedbeds should be formed as far ahead of planting and treatment as possible to permit maximum weed and grass emergence. Seeding should be done with a minimum amount of soil disturbance. Weeds and grasses emerging after application will not be controlled. Crop plants emerged at time of application will be killed.

BARLEY, WHEAT: Preplant and Preemergence Treatment—Apply 1 to 2 qts. per sprayed acre as a band treatment over the crop row, or as a broadcast treatment prior to, during or after planting—but before emergence of the crop. **Aerial Application**—5 to 10 gals. water per acre. **Ground Application**—Use 20 to 60 gals. diluted spray. Add ORTHO X-77 Spreader (non-ionic) at 8 oz. per 100 gals. of diluted spray. Seedbeds should be formed as far ahead of planting and treatment as possible to permit maximum weed and grass emergence. Seeding should be done with a minimum amount of soil disturbance. Weeds and grasses emerging after application will not be controlled. Crop plants emerged at time of application will be killed. Do not graze livestock in treated area.

CORN ONLY: For Kill of Existing Vegetation and Residual Weed Control Where Corn Will Be Planted Directly Into a Cover Crop, Established Sod or in Previous Crop Residues.

Tank-Mix with Atrazine:

Apply 1 to 2 pts. ORTHO Paraquat CL plus 2½ to 3¼ lbs. Atrazine 80 Wettable per acre, as a broadcast spray. Refer to Atrazine 80 Wettable label for directions, limitations and cautions. Apply 20 to 60 gals. diluted spray per acre. Add ORTHO X-77 Spreader (non-ionic) at 8 fl. oz. per 100 gals. diluted spray. Add Atrazine to spray tank first, mixing thoroughly in water. Then add Paraquat and surfactant. Constant agitation recommended at all times.

Paraquat plus Atrazine may be applied in liquid nitrogen and/or complete liquid fertilizer solutions when 25 or more gallons of dilute

solution are applied per acre in combination with 1 to 2 pts. of ORTHO X-77 Spreader (non-ionic) per 100 gals. Equipment must be adjusted and calibrated to obtain thorough coverage of undesirable vegetation. Inadequate coverage and/or the absence of X-77 will result in a severe reduction of Paraquat activity. Phosphate containing liquid fertilizer solutions will reduce the activity of Paraquat. When liquid fertilizer solutions containing phosphorus are used with Paraquat, and a rapid kill is desired, use the high Paraquat label rate.

Tank-Mix with AATREX® 80 W and PRINCEP® 80 W:

Apply 1 to 2 pts. ORTHO Paraquat CL plus 1¼ to 2½ lbs. PRINCEP® 80 W plus 1¼ to 2½ lbs. AATREX® 80 W per sprayed acre prior to, during or after planting—but before crop emergence. Use the low rates of PRINCEP and AATREX on light soils, and the higher rates on heavy clay soils. Use 20 to 60 gals. of diluted spray per sprayed acre. Add ORTHO X-77 Spreader (non-ionic) at 8 fl. oz. per 100 gals. diluted spray. Add the AATREX to the spray tank while agitating, then add the PRINCEP. Paraquat and ORTHO X-77 Spreader (non-ionic). Continue agitation during application. Refer to the AATREX and PRINCEP labels for specific precautionary statements. PRINCEP® and AATREX® trademarks of CIBA-GEIGY

Tank-Mix with BLADEX® 80 W:

Apply 1 to 2 pts. ORTHO Paraquat CL plus 1½ to 5 lbs. BLADEX 80 W, depending upon soil type, as a broadcast spray. Apply 20 to 60 gals. diluted spray per acre. Add ORTHO X-77 Spreader (non-ionic) at 1 qt. per 100 gals. diluted spray. Add BLADEX 80 W to spray tank first, mixing thoroughly in water. Then add Paraquat and surfactant. Constant agitation recommended at all times. Do not mix with liquid fertilizer. Refer to BLADEX 80 W label for directions, limitations and cautions. BLADEX® Shell trademark.

FIELD CORN: Postemergence Directed Spray using ORTHO Paraquat CL Alone or ORTHO Paraquat CL + Atrazine Tank Mix—For Control of Emerged Annual Broadleaf Weeds and Annual Grasses less than 4 inches tall—Apply 1 pt. ORTHO Paraquat CL per acre in 20 to 40 gals. of spray mix. Apply when corn plants are at least 10 inches tall. Corn plants shorter than 10 inches may be injured and not recover. Corn height measured from soil surface to top of whorl. Apply with directed spray application equipment. Arrange nozzles to spray no higher than the lower three inches of corn stalks to provide for maximum contact of weeds with minimum contact of corn plants to prevent excessive sheath and lower leaf spotting and desiccation. Add 1 qt. ORTHO X-77 Spreader (non-ionic) per 100 gals. of spray. Do not mix with liquid fertilizer. **For Improved Control of Weeds, Especially Broadleaves, Tank Mix Paraquat and AATREX®:** Add ⅔ to 1¼ lb. AATREX 80W or 1 to 2 pts. AATREX 4L in combination with 1 pt. ORTHO Paraquat CL per acre. Add AATREX 80W or AATREX 4L to spray tank first, mixing thoroughly in water. Then add Paraquat and surfactant. Constant agitation recommended at all times. Refer to AATREX labels for limitations and cautions. Do not graze treated areas or feed treated forage to livestock.

AATREX® trademark of CIBA-GEIGY

CORN: For use in the USDA Witchweed eradication program to kill grassy weeds. Apply 1 qt. ORTHO Paraquat CL in 10 to 20 gals. spray per acre. Add 1 lb. VISTIC® per 100 gals. water. Apply as a spray directed onto the grassy weeds at the base of the corn stalks in the hills or row. Initiate sprays in early July and repeat in early August if regrowth of grassy weeds occurs. Do not graze livestock in treated area.

VISTIC® Registered Trademark of Hercules, Inc.

GRAIN SORGHUM: For Desiccation and Residual Control of Annual Broadleaf Weeds and Grasses Where Sorghum Will Be Planted Directly Into Previous Crop Residues—Apply 1 to 2 pts. ORTHO Paraquat CL plus 2 to 3 lbs. Atrazine 80 Wettable per acre as a broadcast ground spray before, during or after planting but before crop emergence. Refer to Atrazine 80 Wettable label for directions, limitations, cautions and for a list of weeds controlled by preemergence activity of Atrazine. Add ORTHO X-77 Spreader (non-ionic) at 16 to 32 fl. oz. per 100 gals. diluted spray. Water or nitrogen solutions may be used as a carrier. Add Atrazine to spray

tank first, mixing thoroughly in carrier. Then add Paraquat and X-77. Constant agitation recommended at all times. This herbicide tank mixture will not control volunteer sorghum or shattercane which emerges after application.

GRAIN SORGHUM: Postemergence Directed Spray—For Kill of Emerged Crabgrass and Pigweed 3 Inches or Less in Height—1 to 2 pts. ORTHO Paraquat CL in 20 to 40 gals. water per sprayed acre. Use higher gallonage of water for larger weeds. For band applications, 1 pt. ORTHO Paraquat CL will cover 2 land or crop acres when a 20 inch band is treated in 40 inch rows. Treat when grain sorghum is naturally standing 12 inches tall or more. Add ORTHO X-77 Spreader (non-ionic) at 1 qt. per 100 gals. of spray. Do not exceed 30 psi; high pressure contributes to spray drift. For best results, apply ORTHO Paraquat CL at 1 pt. per sprayed acre to grass and weeds less than 2 inches tall. Grass and weeds 2 to 3 inches tall should be sprayed with 2 pts. ORTHO Paraquat CL per sprayed acre. Use precision application equipment with spray nozzles mounted on skid shoes, oiling shoes, fenders or cultivators with gauge wheels and adjusted so that only the lower 3 inches or less of the sorghum stalk is sprayed.

For best coverage on single rows, use 4 flat fan nozzles per row, 2 nozzles on each side of the row. The 2 forward nozzles should point forward and downward and rear nozzles should point to the rear and downward. For double row sorghum use one skid between the two rows with one nozzle spraying backward and downward. Some sheath and lower leaf spotting and desiccation will occur. Basal spotting does not penetrate beneath and outer sheath. Degree of injury is related to precision of application and wind velocity. Do not spray under windy conditions.

TOMATOES, PEPPERS (Middle Atlantic, Southeast, South Central Regions and Southwest to the Western Boundary of Texas): Postemergence Directed Spray—For Kill of Emerged Annual Broadleaf Weeds and Grasses and for Top Kill and Suppression of Emerged Perennial Weeds between Plastic Mulch Covered Rows after Crop Plant Emergence or Establishment—Apply as directed spray using 1 qt. per sprayed acre in 20 to 100 gals. spray mix. Apply with conventional ground equipment directing spray between the rows and using shields to prevent spray contact with crop plants. Add ORTHO X-77 Spreader (non-ionic) at 8 fl. oz. per 100 gals. spray mix. Apply when weeds and grasses are succulent and weed growth is 1 to 6 inches high. Weeds and grasses emerging after application will not be controlled. Do not allow spray to contact tomato or pepper plants as injury or excessive residues may result. Do not apply more than 3 applications per crop season. Do not allow animals to graze on treated areas.

PASTURE AND RANGE RESEEDING: Suppression of Existing Sod and Undesirable Emerged Broadleaf Weeds and Grasses to Permit Pasture and Range Reseeding—Apply recommended rates in water to make 18 to 75 gals. diluted mix per sprayed acre. Add 8 oz. ORTHO X-77 Spreader (non-ionic) per 100 gals. spray. Apply broadcast or in bands over the drill row prior to, or at time of seeding desired grasses and/or forage legumes. Apply as a band treatment when recovery of the sprayed sod is desired, such as in the case with desirable fescue grass. Apply as a broadcast treatment when existing grass species is undesirable and should be totally suppressed, such as in the case with run-down bluegrass sod.

West of Cascade and Sierra Nevada Mountains—1 to 2 pts. per sprayed acre prior to, or at time of seeding grasses such as Harddinggrass and Palestine Orchardgrass. Apply in October through December after first fall rains and after weeds have emerged and sod has started new growth. For best seeding results, apply on moderate to heavily grazed areas. Do not use in areas with heavy sod and weed growth. Do not pasture treated areas until growth of newly planted seedlings is 3 to 6 inches high.

East of Cascade and Sierra Nevada Mountains and West of Rocky Mountains—1 to 4 pts. per sprayed acre prior to, or at time of seeding of grasses such as perennial wheatgrasses. Apply in spring after broadleaf weeds and grasses have emerged but before spring rains have stopped. If broadleaf weeds such as tumble mustard (*Sisymbrium altissimum*) are a problem, add 2,4-D (butyl ester) at 0.5 lb. active per sprayed acre. Do not pasture treated areas for one year following treatment.

East of Rocky Mountains—1 to 2 pts. per sprayed acre during the growing season. Use the 2 pts. rate to suppress vigorous and coarse sod species such as Bromegrass. See specific directions for use in the South and Southeast for suppression of Bermudagrass or Bahiagrass sods. Apply prior to, or at time of seeding grasses or forage legumes such as alfalfa, clover and birdsfoot trefoil. Apply only to grazed or mowed pastures which are not more than 2 to 3 inches in height at time of treatment. Do not graze treated areas until the newly planted seedlings have reached their recommended grazing height. Under good seedling emergence and growing conditions, allow a minimum of one month between treatment and first grazing. Seedling grasses, and forage legumes should be at least 6" tall; Sudangrass must be 18" tall and Sorghum-sudan 24" tall at first grazing. Under late fall or winter conditions, it may take 3 to 5 months for seeded grasses and/or legumes to reach recommended grazing height.

South and Southeast—Bermudagrass or Bahiagrass Sods—Late Summer or Early Fall Application for Sod Suppression when Seeding Winter Annuals: Apply 1 pt. per acre in 20 to 30 gals. water in late summer or early fall to sod that does not exceed 3 inches in height. Apply prior to, or at time of seeding winter annuals. Add 1 qt. ORTHO X-77 Spreader (non-ionic) per 100 gals. spray. Do not pasture in treated areas until 60 days after treatment or until winter annual seedlings are 9 inches tall.

BERMUDAGRASS PASTURES: For the Suppression of Emerged Annual Broadleaf and Grassy Weeds including Little Barley, Bromes, Buttercup and Carolina Geranium in Dormant Bermudagrass Pastures—Apply 1 pt. in 20 to 30 gals. water per acre during March. For control of Little Barley, apply before the mid boot stage. Add 1 qt. ORTHO X-77 Spreader (non-ionic) per 100 gals. spray mix. Do not pasture or mow for hay until 40 days after treatment.

POTATOES: (After Planting—Preemergence Treatment)
Ground Application—Apply 1 to 2 pts. per acre as a broadcast application in 30 to 100 gals. water. Add ORTHO X-77 Spreader (non-ionic) at 8 oz. per 100 gals. spray. **Aerial Application (North Dakota Only)**—Apply 1 to 2 pts. per acre in 5 to 10 gals. of water. Add ORTHO X-77 Spreader (non-ionic) at 1 qt. per 100 gals. of diluted spray. The application should be delayed to provide maximum weed and grass emergence but should be applied not later than ground cracking, before potatoes have emerged. Application made after crop emergence has reduced yields of certain sensitive varieties. Weeds and grasses emerging after application will not be controlled. Postemergence cultivations should be performed as required to control subsequent weed and grass emergence.

SOYBEANS: Preplant or Preemergence Treatment—Apply 1 to 4 pts. of Paraquat per sprayed acre as a band treatment over the crop row, or as a broadcast treatment, prior to, during or after planting—but before emergence of the crop. Use the 1.0 pt. rate when spring annual broadleaf weeds and grasses are less than 4 inches high or when a directed spray or cultivation will be used within 3 weeks after planting. **Aerial Application**—5 to 10 gals. spray mix per acre. **Ground Application**—20 to 60 gals. spray mix per acre. Add ORTHO X-77 Spreader (non-ionic) at 8 fl. oz. per 100 gals. of diluted spray. Seeding should be done with a minimum amount of soil disturbance. Weeds and grasses emerging after application will not be controlled. Crop plants emerged at time of application will be killed.

SOYBEANS (Preemergence Treatment)—For Kill of Emerged Annual Broadleaf Weeds and Grasses and For Top Kill and Suppression of Emerged Perennials Where Soybeans Will Be Planted Directly into a Preformed Bed, Cover Crop, or in Previous Crop Residues.

Tank-Mix with LOROX®:

Apply 1 pt. ORTHO Paraquat CL plus 1 to 3 lbs. LOROX® Linuron Weed Killer—50 Wettable on sandy loam, 1¼ to 4 lbs. on silt loam, 1½ to 5 lbs. on clay loam soils per sprayed acre as a band treatment over the crop row or as a broadcast treatment after planting—but before emergence of the crop. **Aerial Application**—Apply 5 to 10 gals. spray mix per acre. **Ground Application**—Use 20 to 60 gals. diluted spray. Add ORTHO X-77 Spreader (non-ionic)

at 8 oz. per 100 gals. of diluted spray. Seeding should be done with a minimum amount of soil disturbance. Crop plants emerged at time of application will be killed. For band applications, compute amount of Paraquat and LOROX needed per acre by dividing the band width by the inches between crop rows and then multiplying the answer by the recommended broadcast rates. Refer to the LOROX Linuron Weed Killer label for cautions.

This herbicide tank mixture WILL NOT CONTROL Rhizome Johnsongrass.

LOROX® trademark of DuPont.

Tank-Mix with LASSO® and SENCOR®:

For Contact Action on Emerged Weeds and Preemergence Control of Smartweed, Pigweed and Cocklebur, Foxtail and Crabgrass. (This tank mix should be used instead of Paraquat + LOROX or PARAQUAT + SENCOR when better preemergence control of crabgrass and foxtail is desired.)

Apply 1 to 2 pts. ORTHO Paraquat CL plus 2 to 2½ qts. LASSO (4 lb./gal. EC) plus ½ to 2 lbs. SENCOR 50 WP per acre as a preemergence broadcast ground spray. Refer to LASSO and SENCOR 50 WP labels for rates which are dependent upon soil textures, directions, limitations and cautions. Apply in 20 to 60 gals. spray mix per acre. Use the 2 pt. rate of Paraquat if weeds are 4 to 6 inches tall. This mixture will not control weeds taller than six inches. Add ORTHO X-77 Spreader (non-ionic) at 8 fl. oz. per 100 gals. of diluted spray. Add SENCOR 50 WP to the spray tank first and mix thoroughly. Then add LASSO followed by ORTHO Paraquat CL and ORTHO X-77 Spreader. Constant agitation is recommended at all times. Do not use treated vines for feed or forage.

LASSO® trademark of Monsanto Company.

SENCOR® trademark of the Parent Company of Farbenfabriken Bayer GmbH, Leverkusen.

Tank-Mix with SENCOR®:

For Contact Action on Emerged Weeds and Preemergence Control of Smartweed, Pigweed and Cocklebur. (This tank mix should be used instead of Paraquat + LOROX when infestations of emerged smartweed, pigweed and cocklebur are present at application and when better preemergence control of these species is desired.)

Apply 1 to 2 pts. ORTHO Paraquat CL plus ¾ to 2 lbs. SENCOR 50 WP according to SENCOR label recommendations as a broadcast ground spray before, during or after planting but before emergence of the crop. Use the 2 pt. rate of ORTHO Paraquat CL if weeds are 4 to 6 inches tall. This mixture will not control weeds taller than six inches. Apply in 20 to 60 gals. spray mix per acre. Add ORTHO X-77 Spreader (non-ionic) at 1 qt. per 100 gals. of diluted spray. Do not use treated vines for feed or forage.

Refer to the SENCOR 50 WP label for cautions, limitations and recommended rates for specific soil textures. In using minimum tillage equipment, it is important to observe the proper planting depth caution stated on the SENCOR label so application is not made directly onto the soybean seed.

SENCOR® trademark of the Parent Company of Farbenfabriken Bayer GmbH, Leverkusen.

SOYBEANS: Postemergence Directed Spray—For control of seedling Johnsongrass, Crabgrass, Goosegrass, Brachiaria, Echinochloa spp. (Texas Millet) and pigweed less than 2 inches tall apply ORTHO Paraquat CL at 4 fl. oz. (.063 lb. active) per acre. Use proportionately less for band treatments...for example on 40 inch rows and 16 inch band apply 1 gal. ORTHO Paraquat CL to 80 acres.

For 2 to 4 inch grass and 2 to 3 inch pigweed apply ORTHO Paraquat CL at 8 fl. oz. (.125 lb. active) per acre...for example on 40 inch rows and 16 inch band apply 1 gallon ORTHO Paraquat CL to 40 acres. Soybeans should be 8 inches tall at first application. If needed, make second application 7 to 14 days later. Do not treat more than twice.

Apply 20 gals. spray mix per treated acre. Use proportionately less for band treatments...for example 8 gallons spray mix per 16 inch band on 40 inch rows.

For best coverage, use 4 flat fan nozzles per row, 2 nozzles on

each side of row. The two forward nozzles should point forward and downward and rear nozzles should point to the rear and downward. Do not exceed 30 psi; high pressure contributes to drift. Adjust nozzles to spray no higher than the lower three inches of the soybean plant. Do not treat if soybeans are below 8 inches tall; soybeans treated topically will be killed. Add ORTHO X-77 Spreader (non-ionic) at 1 to 2 qts. per 100 gals. of spray. Do not graze treated areas or feed treated forage to livestock.

FOR KILL OF EMERGED VOLUNTEER BARLEY (California Only)—Preplant in Cotton, Potato, Lettuce, Melon, Safflower, Sugar Beet and Tomato Fields—Apply $\frac{1}{2}$ to 1 pt. per acre broadcast as a pre-plant treatment to pre-formed seedbeds. **Aerial Application**—Use 5 to 10 gals. water per acre. Add ORTHO X-77 Spreader (non-ionic) at 8 oz. per 100 gals. diluted spray.

SEEDBED PREPARATION FOR ESTABLISHING GRASSES FOR SEED PRODUCTION: To Control Grasses and Broadleaved Weeds—Prepare the seedbed and allow weed seeds to germinate. When broadleaved weeds and annual grasses are at the 3 to 5 leaf stage apply 1 qt. in 20 to 40 gals. water per acre (larger weeds will be less affected by this treatment). Add ORTHO X-77 Spreader (non-ionic) at 8 oz. per 100 gals. diluted spray. This treatment can be repeated prior to or on day of seeding. Do not allow animals to graze on treated areas. Do not use seed from treated areas for animal feed. Do not use straw from treated areas for animal bedding or feed.

ALFALFA, CLOVER (Washington, Oregon, Colorado, Idaho, Montana, Utah, Nevada and Wyoming): Apply November through March for Desiccation of Ryegrass, Bluegrass, Cheatgrass, Dogfennel, Chickweed and Tansy Mustard in Dormant Alfalfa and Clover, Except Annual Clover—Apply 2 to 3 pts. per acre (use high rate for cheatgrass) in 20 to 100 gals. spray mix by ground as a broadcast application. Apply by air in 5 to 10 gals. spray mix per acre. Apply to established stands after the last fall cutting when the crop is dormant and before spring growth starts. Do not apply if regrowth following the last fall cutting is more than 2" tall. Alfalfa and clover foliage present at the time of application will be burned. Apply when the broadleaved weeds and grasses are succulent and growth is from 1 to 6" tall. Add ORTHO X-77 Spreader (non-ionic) at 8 to 32 oz./100 gals. spray mix. Do not pasture animals in treated fields before first cutting. Do not graze, cut or harvest within 90 days of application. Do not apply more than once per season.

NONCROP AREAS (Roadsides, Highway Margins, Rights-of-way, Around Commercial Buildings, Power Plants, Storage Yards and Other Installations, Fence Lines, Parkways and Similar Non-Crop Areas)—For the Control of Annual Broadleaved Weeds and Grasses (such as, Burclover, Chickweed, Filaree, Groundsel, Nettle, Pigweed, Plantain, Puncturevine, Purslane, Red Clover, Shepherdspurse, Thistle, Wild Mustard, Wild Radish, Wild Oats, Blue Grass, Cheat Grass, Crabgrass) and Top Kill and Suppression of Perennial Weeds (such as Bermudagrass, Johnsongrass, and Morningglory)—1 to 2 qts. per acre. Apply for full coverage and thorough weed contact (50 to 100 gals. diluted spray per acre). Best results are obtained when applications are made to young, succulent weeds and grasses. Mature, woody weeds are less susceptible. Repeat as needed. Add ORTHO X-77 Spreader (non-ionic) at 8 oz. per 100 gals. Paraquat is compatible with many residual herbicides. Avoid spray contact with foliage or fruit of food crops and ornamentals.

WORKER SAFETY RULES

Avoid accidents. Follow these pesticide Safety rules when handling this product.

USE STRICTLY IN ACCORDANCE WITH DANGER STATEMENTS AND DIRECTIONS, AND WITH APPLICABLE STATE AND FEDERAL REGULATIONS.

WASH SPLASHES from skin and eyes immediately.
REMOVE and wash contaminated clothing.
WASH before eating, smoking and drinking.

CONCENTRATE/MIXING

Wear full face shield, rubber gloves and apron when handling concentrate.

SPRAY APPLICATION

Avoid working in spray mist. If there is risk of exposure wear goggles and approved face mask capable of filtering spray droplets. Wear waterproof footwear and clothing when spraying or when contacting vegetation wet with spray.

ENVIRONMENTAL SAFETY CAUTIONS

WILDLIFE

This product is toxic to wildlife. Birds and other wildlife in treated areas may be killed. Keep out of lakes, streams and ponds.

DRIFT

ORTHO Paraquat CL is a contact herbicide that kills all green plant tissue. Do not apply under conditions involving possible drift to food, forage or other plantings that might be damaged or the crops thereof rendered unfit for sale, use or consumption. Do not apply when weather conditions favor drift from areas treated.

EQUIPMENT/CONTAINERS

Flush all spray equipment with water after use each day. ORTHO Paraquat CL is corrosive to aluminum. Aluminum spray equipment and aluminum aircraft structures that are exposed to spray solution or spray drift should be flushed thoroughly with water immediately after use.

WASH and destroy containers when empty—Never reuse

DO NOT contaminate water when cleaning equipment or disposing of wastes. Apply this product only as specified on this label.

STORE AT TEMPERATURES ABOVE 32°F.

Do not contaminate feed, foodstuffs or drinking water.

Do not store next to feed or food, or transport in or on vehicles containing foodstuffs or feeds.

CONDITIONS OF SALE: 1. Chevron Chemical Company (Chevron) warrants that this material conforms to the chemical description on the label and is reasonably fit for use as directed hereon. Chevron neither makes, nor authorizes any agent or representative to make, any other warranty of FITNESS or of MERCHANTABILITY, guarantee or representation, express or implied, concerning this material.

2. Critical and unforeseeable factors beyond Chevron's control prevent it from eliminating all risks in connection with the use of chemicals. Such risks include, but are not limited to, damage to plants and crops to which the material is applied, lack of complete control, and damage caused by drift to other plants or crops. Such risks occur even though the product is reasonably fit for the uses stated hereon and even though label directions are followed. Buyer and user acknowledge and assume all risks and liability (except those assumed by Chevron under 1 above) resulting from handling, storage, and use of this material.

Manufactured for

Chevron Chemical Company

Ortho Division, San Francisco, CA 94119 Richmond, CA 94804

Product 1000-27

Form 7494-S

EPA Reg. No. 239-2186-AA