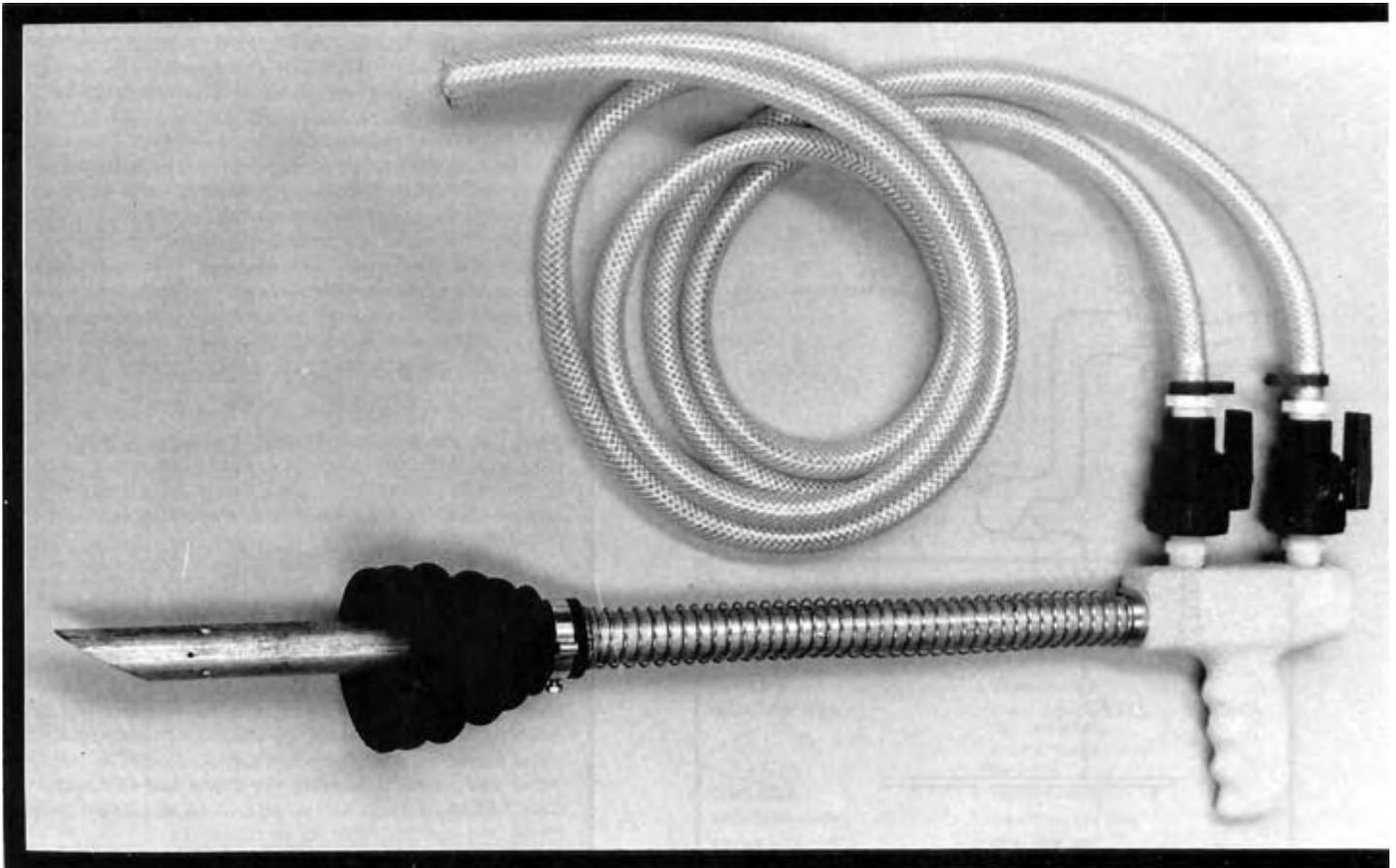


Evaluation Report

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Chem-Ease Chemical Extractor

A Co-operative Program Between



CHEM-EASE CHEMICAL EXTRACTOR

MANUFACTURER AND DISTRIBUTOR:

Dutch Industries Ltd.
705 - 1st Avenue
Regina, Saskatchewan
SN4 4M4

RETAIL PRICE:

\$196.00 (March, 1988, f.o.b. Lethbridge, Alberta).

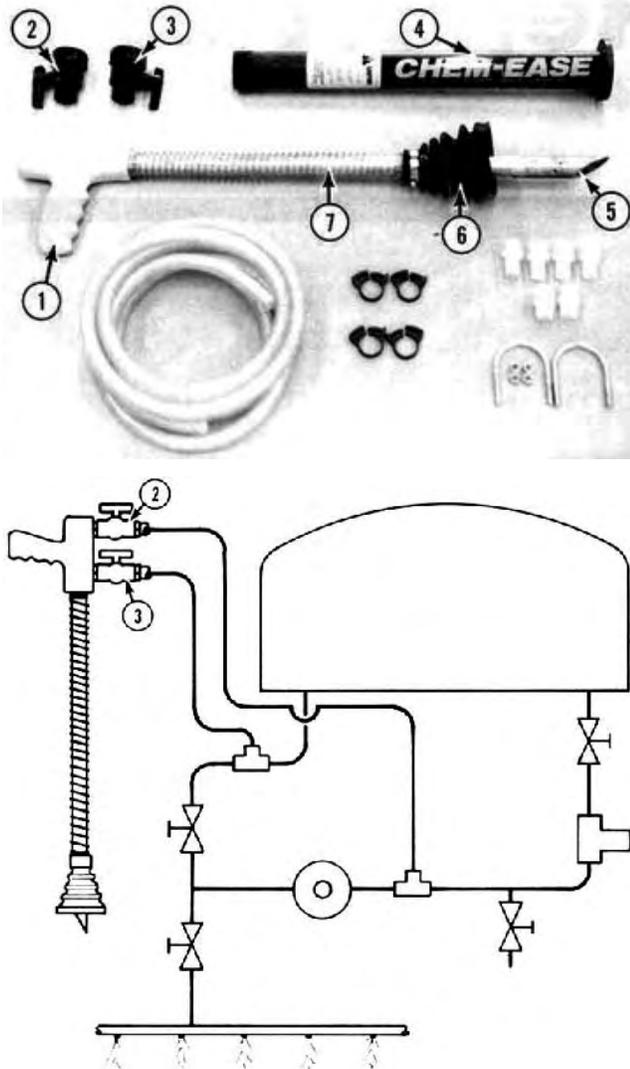


FIGURE 1. Chem-Ease Chemical Extractor: (1) Handle, (2) Extraction Cycle Control Valve, (3) Rinse Cycle Control Valve, (4) Holder, (5) Sharp Probe End, (6) Spring-Loaded Rubber Boot, (7) Probe.

SUMMARY AND CONCLUSIONS

Rate of Work: Time required to transfer liquid chemical varied and depended on the suction head at the pump and viscosity of the chemical. It took about one minute to induct most chemicals from a typical 2.2 gal (10 L) chemical container. Viscous chemicals like Lorox L (linuron) took up to 8 minutes. Diluting the chemical by alternating between the rinse and extraction cycle reduced the transfer time.

Quality of Work: Extracting liquid chemical was rated as very good and convenient when all the chemical from the container was needed. When accurately extracting a pre-determined amount of chemical from the container the Chem-Ease was rated as fair.

Rinsing effectiveness depended on the sprayer's reload system. Rinsing effectiveness was very good with clean water from the nurse tank and fair when using the tank mix solution. The twelve nozzles at the tip of the Chem-Ease probe made it

easy to thoroughly rinse the chemical container.

With the chemical being inducted prior to the pump inlet, chemical agitation was thorough and rated as very good.

The holder for the Chem-Ease probe was very good in that it effectively protected the probe from contamination.

Ease of Operation: Ease of operation was rated as fair, even though the two control valves were color coded and had arrows incorporated into the handles. Operation of the unit was not foolproof and operators tended to occasionally overfill containers or dilute chemical with water. It was important to follow operating instructions very carefully to prevent such occurrences.

Rinsing the interior of chemical containers was very good. The container could be rinsed several times by alternating the operation between the red and blue valves.

Penetration of the probe into metal or plastic containers was very good. The probe was sharp and easily pierced any containers encountered during the test. Care had to be exercised when piercing through the caps of plastic containers. A greater thrust was needed which could carry the probe through to the bottom of the container.

Ease of Installation: Ease of installation was very good. The Chem-Ease components were small, light and easy to install, taking one man about two hours using common farm shop tools. Care had to be exercised to prevent crushing the plastic holder when tightening the U-bolt nuts.

Operator Safety: Operator safety of Chem-Ease was good. The unit was safe to operate when all the chemical in the container was extracted. It eliminated the need to lift chemical containers and pour the chemical into the tanks. The rubber boot prevented chemical splashing and reduced operator exposure to chemical vapour. The operator increased his chances of exposure to the chemical when an accurately measured amount of chemical had to be extracted from the chemical container. A safety decal was provided detailing the proper use of the unit. Care had to be exercised when rinsing to prevent over filling and foaming with some chemicals.

Operator's Manual: The instructions provided were good and provided useful information on installation, safety and operation.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Modifying the Chem-Ease to allow accurate measurement of a pre-determined amount of chemical.
2. Modifying the control valves to distinguish the extraction and rinse cycles more conveniently.

Station Manager: R. P. Atkins

Project Manager: L. B. Storzynsky

THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. A simple, accurate 10 litre metering device (presently undergoing field test) will be available in 1988. This product will be available as an add-on, for those users requiring accurate chemical metering.
2. We have carried out an extensive user survey and have not obtained any comments from users in this regard. The distinctive colors, (red for chemical and blue for rinse water) and the flow indicator arrows appear adequate to enable most farmers to readily distinguish the difference.

GENERAL DESCRIPTION

The Chem-Ease Chemical Extractor is mounted on field sprayers to transfer liquid agricultural chemicals from their original containers directly to the sprayer tank. The Chem-Ease is hand-operated by inserting the probe through the chemical container spout or by piercing the top of the container. A spring-loaded boot covers the chemical container opening to reduce operator exposure to chemical splashing or vapour. The Chem-Ease probe also contains a series of rinsing jets to rinse the interior of the container.

FIGURE 1 shows the components of the chemical extractor

while detailed specifications are given in APPENDIX 1.

SCOPE OF TEST

The Chem-Ease chemical extractor was mounted on a Summers truck mounted field sprayer and used to transfer about 83.6 gals (380 L) of chemical. Chemicals used are listed in TABLE 1.

The Chem-Ease was evaluated for rate of work, quality of work, ease of operation and installation, operator safety and suitability of operator's manual.

TABLE 1. Chemical Used

Brand Name	Chemical Ingredient	Amount Transferred		Container Size		Extraction Time min
		gal	L	gal	L	
Lorox L	Linuron	11.0	50	2.2	10	7.6
MCPA	Amine	22.0	100	2.2	10	1.0
Roundup	glyphosate	8.8	40	2.2	10	1.1
Rustler	glyphosate + 2, 4-D	4.4	20	2.2	10	1.0
2, 4-D	Amine	2.2	10	2.2	10	-
Avenge 200-C	difenzoal	35.2	160	4.4	20	1.6
Rinse Solution	-	-	-	2.2	10	0.5
Total	-	83.6	380	-	-	-

RESULTS AND DISCUSSION

Rate of Work: The time required to transfer liquid chemical varied and depended on the suction head at the sprayer pump and the viscosity of the chemical. Chemical transfer rate increased as the inlet suction head increased on the pump. Sprayer suction head could be increased by throttling the pump supply valve (FIGURE 1) and by increasing the flow to the agitator or by-pass lines. For example, chemical transfer rates were restricted until the suction head at the pump inlet was increased by adding a by-pass hose to the Summers plumbing system. Most sprayer systems would have sufficient suction head to operate the Chem-Ease effectively and modifications would not be required.

Transferring chemical to the Summers Sprayer tank from a typical 2.2 gal (10 L) chemical container took about one minute for most of the chemicals used (TABLE 1). For viscous chemical such as Lorox L (linuron) it took up to 8 minutes to transfer 2.2 gal (10 L). For viscous chemicals dilution with water by alternating between the Chem-Ease extraction and rinse cycles was required for maximum transfer rates. Extracting 2.2 gal (10 L) of rinsed solution took about 30 seconds.

QUALITY OF WORK

Chemical Extraction: Extracting liquid chemical was convenient and rated as very good when all the chemical from the container was needed. The Chem-Ease probe was simply pierced through the container and operated until all the chemical was extracted. When accurately extracting a pre-determined amount of chemical from the container the performance of the Chem-Ease reduced to fair. The manufacturer recommended inserting the Chem-Ease probe through the chemical container spout to the desired depth and marking the probe just above the boot assembly with a small file. Therefore, the same amount of chemical could be extracted on subsequent containers of the same size. Marking the probe for various chemical amounts and for different sized chemical containers was time consuming and inconvenient. This could expose the operator to chemical vapour and, at best, provided an approximation of the amount of chemical extracted. Determining the desired probe depth was difficult to estimate because of the way the rubber boot covered the chemical container spout. For convenience, operators tended to lift the rubber boot and peer through the container spout to judge the depth of the probe or the amount extracted. An alternative was pouring the chemical into a measuring container and then extracting the measured amount with the Chem-Ease. It is recommended that the manufacturer consider modifying the Chem-Ease to allow for accurate measurement of a predetermined amount of chemical.

Rinsing: The rinsing effectiveness depended on the sprayer's reload system. On the Summers truck mount sprayer the rinsing solution was equivalent to the spray mix in the tank. Rinsing effectiveness was rated as fair when using the tank mix solution. Sprayers using the sprayer pump for loading the tank could use clean water from the nurse tank for rinsing. Rinsing effectiveness was very

good when using clean water. Rinsing action was thorough because the Chem-Ease probe contained twelve nozzles that sprayed the interior of the chemical at various angles.

Chemical Agitation: When using the Chem-Ease the extracted chemical passed through the pump and agitator providing immediate mixing of the chemical. Chemical agitation was thorough and rated as very good. After loading no further agitation was required unless the solution was left sitting for a long period of time.

Storage: The Chem-Ease probe was stored in a holder mounted on the sprayer. The holder for the probe was very good in that it prevented contamination of the probe from dust and field debris. The handle was exposed to the spray cloud and therefore it was necessary to wear rubber gloves when handling the Chem-Ease.

EASE OF OPERATION

Controls: The control valves for the Chem-Ease were rated as fair. The valves (FIGURE 2) were colour-coded to distinguish between the extraction and rinse cycles. Opening the red valve transferred chemical to the sprayer tank and opening the blue valve provided rinse water through the 12 jet nozzles to rinse the interior of the chemical container. Operating the valves was easy and required one valve to be opened and the other closed. Remembering which valve to use tended to be confusing at times and resulted in chemical containers overflowing or accidental dilution of the chemical. It was important to follow the operating instructions carefully to prevent such occurrences. The model provided for testing incorporated two arrows on each valve handle that indicated fluid flow in both directions. The arrows were small and hardly visible after the paint wore off. It is recommended that the manufacturer consider modifying the control valves to distinguish the extraction and rinse cycle more conveniently.

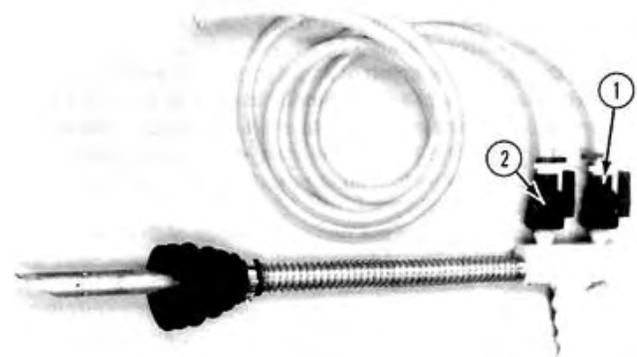


FIGURE 2. (1) Red Valve-Extraction, (2) Blue Valve-Rinse.

Rinsing: For environmental protection, it is recommended that chemical containers be triple rinsed. Rinsing the interior of a chemical container was convenient, fast and rated as very good. The container could be rinsed several times by alternating the operation between the red and blue valves. With the blue valve open, twelve nozzle jets on the probe sprayed the interior of the chemical container at several angles. The spring loaded boot over the container opening reduced spray feedback. Opening the red valve extracted the rinse water. About 2 to 25 oz (57 to 710 mL) of rinse solution remained inside a 2.2 gal (10 L) chemical container. When the operator took the time and effort to empty the container thoroughly only 2 to 3 oz (57 to 85 mL) remained.

Probe Penetration: Penetration of the probe into metal or plastic containers was very good. The probe was sharp and with a quick thrust could easily pierce through any containers encountered during the test. Size and type of container determined how much force was required to penetrate the container. Piercing through a plastic container cap was more difficult but provided a better seal for the spring loaded rubber boot.

At first, the tendency was to partially pierce the container and then carefully insert the rest of the probe to avoid piercing the bottom of the container. This was a concern when piercing plastic container caps because the force needed carried the sharp probe close to the bottom of the container. Therefore, most operators removed the cap. With experience it became easier to penetrate all kinds of chemical

containers without fear of piercing the bottom of a container.

When extracting a pre-determined amount of chemical, it is advisable the probe be inserted in the container spout so the container can be resealed for storage.

EASE OF INSTALLATION

Ease of installation was very good. The Chem-Ease components were small, light and easy to install, taking one man about two hours using common farm shop tools. Installation instructions provided were easy to understand.

The Chem-Ease holder was mounted at the rear of the truck sprayer by the two U-bolts provided. Care had to be exercised to prevent crushing the holder when tightening the U-bolts nuts. Two tee fittings and four hose barbs were needed to connect the two Chem-Ease hoses to the Summers sprayer plumbing system. The size of the tees and barbs depended on the sprayer pump inlet and agitation hose size.

OPERATOR SAFETY

Operator safety of the Chem-Ease was good. The Chem-Ease was safe when emptying the entire chemical container because it eliminated the need to lift the container and pour the chemical into a sprayer or inductor tank filler opening. The spring-loaded rubber boot covered the pierced opening or container spout, eliminating chemical splashing and reducing exposure to chemical vapour. The Clean-Ease was not as safe to operate when an accurately measured amount of chemical had to be extracted from the chemical container. Removing a pre-determined amount of chemical as described by the manufacturer was inconvenient and could expose the operator to the chemical. Operators tended to lift the rubber boot and peer through the pierced opening or spout to see the amount extracted. After drawing a pre-determined amount of chemical, the probe was contaminated with pure chemical concentrate, which tended to drip on the holder, the sprayer and, potentially, the operator. It is advisable that an empty container be used to rinse the probe before storing.

Care had to be exercised during operation of the Chem-Ease in the rinse cycle. The rubber boot did not always seal the pierced surface, especially on flexible plastic containers. It is important that the operator follow the instructions carefully to prevent overfilling the container with rinse water and exposing the operator to the rinse solution. The rinsing action also caused foaming that tended to leak by the rubber boot, probe and container.

The Chem-Ease handle contained a non-slip coating which provided a secure hand grip, even when wet. Because the handle was exposed to spray drift during field spraying it is advisable an operator wear rubber gloves when handling the Chem-Ease.

A safety decal was provided and mounted on the holder of the Chem-Ease. The decal cautioned the operator on the operation of the unit.

OPERATOR'S MANUAL

The operator's manual was good and consisted of a set of instruction sheets that included useful information on installation, safety and operation.

APPENDIX I SPECIFICATIONS

MAKE:	Chem-Ease
MANUFACTURER:	Dutch Industries Ltd. 705 - 1st Avenue Regina, Saskatchewan S4N 4M4
CONTROLS:	two ball valves
TRANSFER HOSE:	0.5 in I.D. (13.1 mm)
PROBE LENGTH:	29 in (737 mm)
WEIGHT:	
-hardware	0.3 lbs (0.1 kg)
-plumbing	1.9 lbs (0.9 kg)
-holder	0.9 lbs (0.4 kg)
-probe	<u>6.8 lbs (3.1 kg)</u>
TOTAL	9.9 lbs (4.5 kg)

APPENDIX II MACHINE RATINGS

The following rating scale is used in PAMI Evaluation Reports:

-Excellent	-Very Good
-Good	-Fair
-Poor	-Unsatisfactory

SUMMARY CHART

CHEM-EASE CHEMICAL EXTRACTOR

RETAIL PRICE:	\$196.00 (March, 1988, f.o.b. Lethbridge)
RATE OF WORK:	took about one minute to extract 2.2 gal (10 L) of chemical
QUALITY OF WORK:	
Chemical Extraction	very good; when extracting all the chemical from a container fair; when extracting an accurately measured amount of chemical
Rinsing	
-Fluid	very good; when using clean water fair; when using tank mix
-Action	very good; thorough
Chemical Agitation	very good; instant chemical agitation
Storage	very good; probe protected from environment
EASE OF OPERATION:	
Controls	fair; easy to operate but difficult to distinguish function
Rinsing	very good; fast and convenient
Probe Penetration	very good; easily pierced metal and plastic containers
EASE OF INSTALLATION:	very good; about 2 hours
OPERATOR SAFETY:	good; normal precautions should be taken when handling chemical, safety decal provided
OPERATOR'S MANUAL:	good; useful information



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