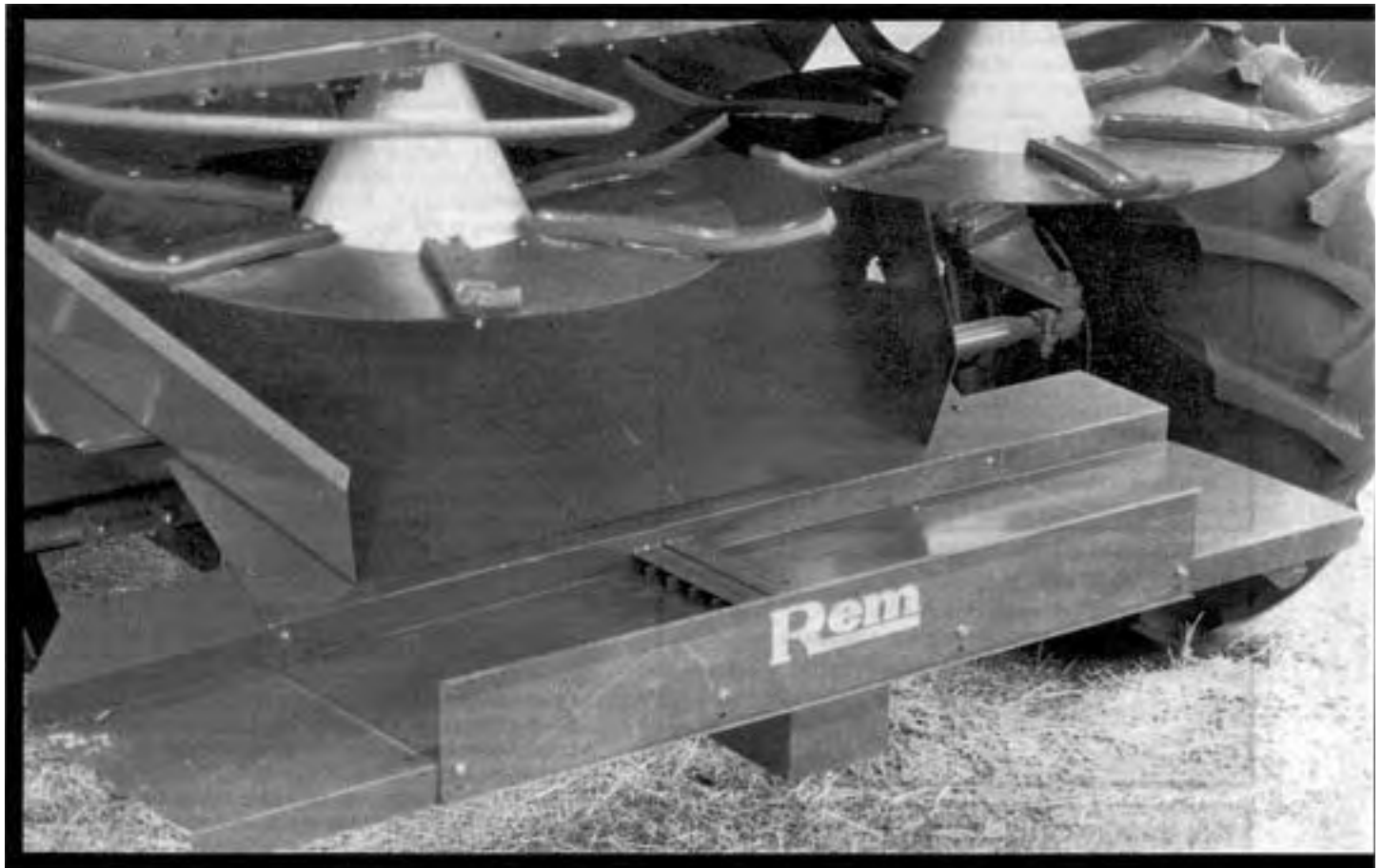


Evaluation Report

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REM Chaff Spreader

A Co-operative Program Between



REM CHAFF SPREADER

MANUFACTURER AND DISTRIBUTOR:

REM Manufacturing Limited
P.O. Box 1207
Swift Current, Saskatchewan
S9H 3X4
Phone: (306) 773-0644

RETAIL PRICE:

\$2950.00 (June, 1991, f.o.b. Humboldt, Saskatchewan with optional drive kit).



FIGURE 1. REM Chaff Spreader.

SUMMARY AND CONCLUSIONS

Quality of Work: The flow of material through the spreader was very good. The REM spreader was designed to be used in conjunction with the combine straw spreaders but could be used without them if the straw was dry and well broken. Chaff spreading was good. Spread widths were usually up to 40 ft (12.2 m). The chaff was spread with acceptable uniformity without dense rows.

Rate of Work: The REM easily handled all of the chaff from the Case IH 1680 combine in all crops.

Ease of Operation and Adjustment: Ease of installation was good. However, no installation instructions were available at the time of the test. Spreader adjustment was very good. The adjustable plate across the rear of the spreader reduced the amount of chaff spread to the rear and seldom needed adjustment. The slide-in mounting and hose quick coupler made removal simple.

Ease of adjusting the combine was good. Access was not hindered. Samples of either shoe or rotor loss were easily collected. Ease of servicing was excellent. Only belt tension required checking or adjustment. Ease of cleaning was excellent.

Power Requirement: The power required to drive the REM spreader was 9.2 hp (6.8 kW).

Safety: No safety decals were provided and no safety information was provided in an operator's manual. The drive was located behind the combine shields and no moving parts were exposed.

Operator's Manual: No operator's manual was supplied.

Mechanical History: No mechanical problems occurred during the test.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Supplying an operator's manual with appropriate installation, operation, maintenance and safety instructions.

Senior Engineer: J.D. Wassermann

Project Manager: L.G. Hill

Project Technologist: A.R. Boyden

THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. We are in the process of writing an operator's manual.

Manufacturer's Additional Comments

Combines that have chopper drives do not require the optional drive kit, which reduces the cost to \$2650.00.

GENERAL DESCRIPTION

The REM chaff spreader mounts at the rear of a combine to spread chaff from the cleaning shoe (see APPENDIX I for applicable combines). It is used in conjunction with the standard spreaders or chopper, which spread the straw.

A sheet metal tray attaches to the rear axle of the combine (FIGURE 1). The chaff falls onto the tray and is propelled out each side by high velocity air from ports located in the center of the tray. The airflow is supplied by a centrifugal fan that is belt driven and mounted on the side of the combine. The air is ducted to the spreader through a 6 in (152 mm) diameter flexible duct.

Specifications for the REM spreader are given in APPENDIX I.

SCOPE OF TEST

The machine evaluated by PAMI was configured as described in the General Description, FIGURE 1, and Specifications section of this report. The manufacturer may have produced different versions of this machine either before or after the PAMI tests. Therefore, when using this report, check to ensure the machine being considered is the same as the one evaluated in this report. If differences are found, PAMI or the manufacturer may be contacted to determine the effect of the changes on performance.

The REM spreader was mounted on a Case IH 1680 combine. It was operated in the conditions shown in TABLE 1 for about 43 hours. During this time, measurements and observations were made in various crops to evaluate the spreader for rate of work, quality of work, ease of operation, adjustment, power requirement, operator safety, and suitability of the operator's manual.

Laboratory tests were also conducted to determine the uniformity of the spread pattern. The REM spreader was used on a stationary Case IH 1680 combine that was fed a typical rate of dry crop material by a conveyor. The straw and chaff was spread over an unobstructed concrete floor. The straw and chaff that fell within 2 ft (0.61 m) wide strips across the width of the spread pattern were weighed to determine spread uniformity.

TABLE 1. Operating Conditions

Crop	Yield Range		Width of cut		Hours	Field Area	
	bu/ac	t/ha	ft	m		ac	ha
Barley	59 - 100	3.2 - 5.5	25	7.5	3	21	8.5
Canola	21 - 36	1.2 - 2.0	18.5, 20	5.6, 6.0	11	90	36.4
Flax	22 - 27	1.4 - 1.7	29	8.7	6	59	23.9
Oats	94 - 111	3.4 - 4.0	14	6.7	6	24	9.7
Wheat	26 - 56	1.8 - 3.8	19, 30	5.7, 9.0	17	184	74.5
Total					43	378	153

RESULTS AND DISCUSSION

QUALITY OF WORK

Chaff Handling: Chaff handling was very good.

Dry chaff flowed easily down the sloped chaff pan to the spreader tray. In tough conditions some chaff was caught at the corners of the sloped pan, however, this did not cause a problem.

The high velocity air from the ports propelled all of the chaff from the tray. Although the REM spreader was designed to be used in conjunction with the standard spreaders, it was also tested without the spreaders. As long as the straw was dry and well broken, it spread very effectively. However, even a small amount of long, tough straw would bridge the tray and quickly caused plugging.

An adjustable plate across the rear of the spreader controlled the amount of chaff spread to the rear. The high airflow from the Case IH combine's rotor and shoe made it necessary to adjust this plate to its highest position to minimize the chaff spread to the rear.

Spreading: Chaff spreading by the REM was good.

Chaff and straw spreading is a key part of good soil management. Heavy concentration or rows of chaff and/or straw can cause difficulty in subsequent tillage and seeding operation.

Heavy concentrations may also cause slow soil warming, nitrogen depletion or toxic build up.

Ideally, all crop residue should be redistributed evenly over the field. This seldom happens. To get the most effective spread, it is necessary to match cutting and spreading width closely. It is also important that the spreader provide suitable spread uniformity over the spread pattern.

FIGURE 2 shows the chaff spread pattern of the REM along with the straw spread pattern from the host combine. FIGURE 2 also shows the material concentration across the spread that would be typical for a 50 bu/ac (3.4 t/ha) wheat crop (MOG/G = 1)*, when the spread and cut width are closely matched. APPENDIX II provides a guideline for crop residue concentration ratings.

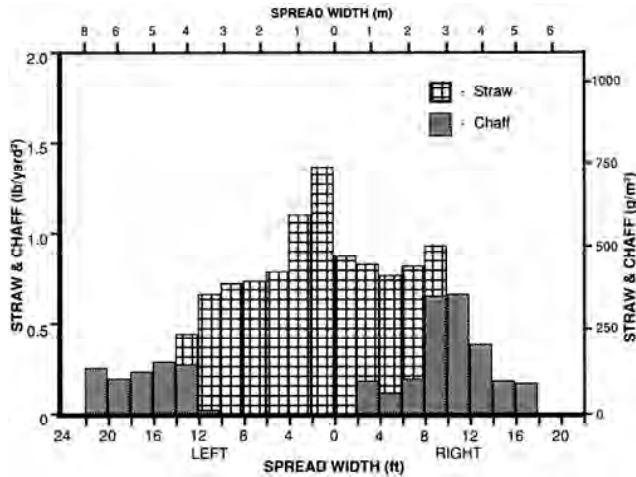


FIGURE 2. Spread Pattern Uniformity.

The REM's spread in FIGURE 2 shows that chaff could be spread up to 40 ft (12.2 m). Chaff concentrations were in the acceptable range when width of cut was similar to spread width. Higher yields or wider widths of cut would increase the concentration while lower yields would reduce the concentration.

In the field, chaff was also typically spread up to 40 ft (12.2 m) (FIGURE 3). Tougher straw and barley crops tended to reduce the spread to about 30 ft (9.1 m). Most of the chaff was spread to the sides and no rows or heavy concentrations were apparent.

The low discharge height minimized the effects of wind.



FIGURE 3. Typical Spread Pattern.

RATE OF WORK

The REM easily handled high feedrates from the Case IH 1680, providing the combine's standard straw spreaders were used. Combine MOG feedrates at times were in excess of 1000 lb/min (27.2 t/h). Typically, 20 to 30% of the MOG was chaff going over the cleaning shoe. The REM spreader easily spread the chaff and any straw that fell past the standard spreaders. Plugging did not occur when the standard spreaders were used.

EASE OF OPERATION AND ADJUSTMENT

Installation: Ease of installation was good. It took 2 people about 6 hours to install the spreader tray, a fan, and a duct. The components could be moved by hand and did not require jacks or

hoists to lift them into place for mounting.

The REM spreader tested was a pre-production unit and installation instructions were not yet available. It is recommended that the manufacturer consider providing an operator's manual with appropriate installation instructions.

Spreader Adjustment: Ease of adjustment was very good.

The adjustable plate across the rear of the spreader was easily adjusted up or down using common wrenches. Adjusting the plate to its highest position reduced the amount of chaff spread to the rear. Once positioned, it seldom had to be readjusted.

No adjustment was required when dropping straw in a windrow.

Removal was simple, taking 2 people about 15 minutes.

Combine Adjustment: Ease of combine adjustment was good.

Although access to the cleaning shoe was restricted by the combine's standard straw spreaders, the REM spreader did not provide any additional restriction.

Access to the shoe discharge for checking grain loss was convenient. Samples of shoe loss could be collected above the spreader tray or from the spreader discharge. However, extreme care was required as the person was very near the combine's rear wheels and straw spreader.

Servicing: Ease of servicing was excellent.

No lubrication was required. The belts for the drive to the fan should be inspected occasionally and tension adjusted when necessary.

Cleaning: Ease of cleaning was excellent.

Only small amounts of chaff were caught on the corners of the chaff pan and were easily removed.

POWER REQUIREMENTS

The power required to drive the REM spreader was 9.2 hp (6.8 kW).

The power requirement did not vary significantly with changes in chaff load. Maximum fan impeller speed was 5000 RPM.

SAFETY

All combine choppers and spreaders are potentially dangerous. Material discharged can reach velocities that can cause serious injury or death. Extreme caution is required at all times when working near operating spreaders.

The REM did not have any warning decals at the time of test. However, the fan drive was mounted under existing shields. Unlike many spreaders, the REM had no moving parts at the chaff discharge tray.

The manual supplied did not provide information on operation, maintenance, or safety.

OPERATOR'S MANUAL

At the time of test, a specific manual was not available for the combine used. A recommendation has already been made.

MECHANICAL HISTORY

The intent of the test was to evaluate functional performance. Extended durability testing was not conducted. No mechanical problems occurred during the 43 hours of field operation.

*MOG/G refers to the weight of Material-Other-than-Grain divided by weight of grain. A value of 1 means that MOG and grain are equal.

**APPENDIX I
SPECIFICATIONS**

MAKE: REM Chaff Spreader
MODEL: for Case IH combines
MANUFACTURER: REM Manufacturing Limited
 Box 1207
 Swift Current, Saskatchewan
 S9H 3X4

DIMENSIONS: (Spreader Body Only)
 -- width 74 in (1880 mm)
 -- length 26 in (660 mm)
 -- height 16 in (406 mm)

WEIGHT: (Total) 189 lb (85.7 kg)

SPREADING SYSTEM:
 -- type pneumatic, side mounted centrifugal fan, ducted to a plenum.
 -- fan REM model 33 H.E.
 -- housing diameter 20 in (510 mm)
 -- inlet diameter 8.25 in (210 mm)
 -- outlet diameter 5.4 in (137 mm)
 -- drive type belt driven from combine
 -- hose aluminum flexible hose 6 in (152 mm) diameter flexible polyethylene hose 6 in (152 mm) diameter
 -- port outlet area 12.7 in² (82 cm²)

SERVICING: no servicing required

COMBINES AVAILABLE FOR: Case IH 1 680
 John Deere 7720, 7721, 8820, 9400, 9500, 9600

**APPENDIX II
CROP RESIDUE CONCENTRATION RATINGS**

Conclusive scientific research could not be located to rate the impact of different concentrations of crop residue. However, field experience has provided basic information in this area. The following explains the development of ratings used by PAMI in this report.

In Western Canada, a typically high wheat yield is about 50 bu/ac (3.4 t/ha). These crops usually have at least an equal amount of Material-Other-than-Grain(MOG). In such crops, when very dry, some combines can put up to 35% of the MOG over the cleaning shoe (i.e. chaff). Conversely, if conditions are tougher, the amount of chaff goes down, and up to 85% of the MOG from the combine is straw.

When chaff is dropped directly behind the combine, the accumulation is very noticeable. However, chaff spread over 40% of the width of cut appears acceptable, while spreading over 50% of the width of cut is desirable. Straw typically appears acceptable when spread over 70% of the width of cut, while spreading over 80% of the width of cut is desirable. The following table shows approximate concentrations of chaff, straw or a combination, which could occur at various levels in the 50 bu/ac (3.4 t/ha) crop described.

These concentrations can be used as a guide for maximum concentrations in other yields also.

CONCENTRATION lb/yd ² (gm/m ²)			
Rating	Chaff	Straw	Total MOG
Desirable	below 0.44 (238)	below 0.66 (358)	below 1.10 (596)
Acceptable	below 0.55 (298)	below 0.76 (412)	below 1.31 (710)
Unacceptable	over 0.55 (298)	over 0.76 (412)	below 1.31 (710)
<i>Theoretical</i>	<i>0.22 (119)</i>	<i>0.53 (297)</i>	<i>0.62 (336)</i>

SUMMARY CHART REM CHAFF SPREADER

RETAIL PRICE	\$2950.00 (June 1991, f.o.b. Humboldt, Saskatchewan)
QUALITY OF WORK	
Chaff Handling	Very Good; when used with the combine's straw spreaders
Spreading	Good; 40 ft (12.2 m), acceptable uniformity without dense rows
RATE OF WORK	Handled all chaff from combine at total MOG feedrates that reached 1000 lb/min (27.2 t/h)
EASE OF OPERATION	
Installation	Good; lifted by hand, but no installation instructions provided
Spreader Adjustment	Very Good; minimal adjustment needed
Combine Adjustment	Good; did not increase restriction to cleaning shoe
Servicing	Excellent; only belt tension required checking or adjustment
Cleaning	Excellent; all straw and chaff easily removed
POWER REQUIREMENTS	9.2 hp (6.8 kW)
SAFETY	No safety decals; no safety information in operator's manual
OPERATOR'S MANUAL	Not supplied
MECHANICAL HISTORY	No mechanical problems occurred



3000 College Drive South
 Lethbridge, Alberta, Canada T1K 1L6
 Telephone: (403) 329-1212
 FAX: (403) 329-5562
<http://www.agric.gov.ab.ca/navigation/engineering/afmrc/index.html>

Prairie Agricultural Machinery Institute

Head Office: P.O. Box 1900, Humboldt, Saskatchewan, Canada S0K 2A0
 Telephone: (306) 682-2555

Test Stations:
 P.O. Box 1060
 Portage la Prairie, Manitoba, Canada R1N 3C5
 Telephone: (204) 239-5445
 Fax: (204) 239-7124

P.O. Box 1150
 Humboldt, Saskatchewan, Canada S0K 2A0
 Telephone: (306) 682-5033
 Fax: (306) 682-5080