

Evaluation Report

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Urvold Straw/Chaff Spreader

A Co-operative Program Between



URVOLD STRAW/CHAFF SPREADER

MANUFACTURER AND DISTRIBUTOR:

Urvold Industries Limited
 P.O. Box 204
 Nobleford, Alberta
 T0L 1S0
 Phone: (403) 824-3737

RETAIL PRICE:

\$3860.00 (July, 1991, f.o.b. Lethbridge, Alberta, Model 4001, suitable for mounting on Case IH 1680 Combine).



FIGURE 1. Urvold Straw and Chaff Spreader.

SUMMARY AND CONCLUSIONS

Quality of Work: Material flow through the spreader was good. No plugging occurred, but a deflector was required to reduce the amount of fine material blown upward behind the combine. Straw and chaff spreading was very good. Spread width was typically 30 ft (9.1 m). Straw and chaff were spread with desirable uniformity. The Urvold was not designed to chop straw.

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

Ease of Operation and Adjustment: Ease of installation was fair. Instructions available were unclear, and a lifting device was required. Ease of spreader adjustment was good. Discharge fin adjustment was provided to control material spread behind the combine. A separate deflector was provided to limit the spread on one side. The spreader could not be easily removed for dropping straw.

Ease of adjusting the combine was good. The spreader was hinged and could be swung away to allow access to the shoe. Checking grain loss was difficult as samples from the shoe or rotor could not be easily collected.

Ease of servicing was very good as grease was only required at 75 hours. Ease of cleaning was excellent.

Power Requirements: The power required to drive the Urvold in tough wheat was 9.5 hp (7.1 kW).

Safety: All combine choppers and spreaders are potentially dangerous. Three small decals were provided. No safety information was included in the manual.

Operator's Manual: The operator's manual was unsatisfactory. Only installation instructions were provided and they were unclear and of poor quality.

Mechanical History: No mechanical problems occurred during the test.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Modifications to prevent chaff from blowing up behind the combine.
2. Improving installation instructions and providing operation, maintenance and safety information in the operator's manual.
3. Modifications for easier removal to allow dropping straw for baling.

4. Modifications to enable easier checking of combine loss.

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. A rear shield for Case IH combines will be considered.
2. New installation, operating and safety instructions will be printed for our new hydraulic drive model.
3. The Urvold straw and chaff blower was developed as a conservation tool and the windrowing of straw for baling was not considered. However, this will be looked into and instructions will be printed in our new manual.
4. Checking for combine loss will be possible on our new hydraulic driven unit. The spreader can be slowed to allow checking material at the sieve.

GENERAL DESCRIPTION

The Urvold spreader mounts at the rear of a combine to spread both straw and chaff (see APPENDIX I for applicable combines). The straw is not chopped.

Straw and chaff fall on two counter rotating impellers. The impellers throw the material to the sides and rear (FIGURE 1).

The spreader is belt driven. Two 90° gearboxes transmit power to the impellers. The spreader body is hinged on one side to swing away from the combine for access to the shoe adjustments. A mount for a shaft speed sensor for the combine's monitoring system is supplied.

Detailed specifications for the Urvold 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 Urvold spreader was mounted on a Case IH 1680 combine. It was operated in the conditions shown in TABLE 1 for about 57 hours. During this time measurements and observations were made 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.

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, 30	7.5, 9.0	4	37	15.0
Canola	21 - 36	1.2 - 2.0	18.5, 20	5.6, 6.0	13	108	43.7
Flax	22 - 27	1.4 - 1.7	29	8.7	5	46	18.6
Oats	94 - 111	3.4 - 4.0	14	6.7	7	26	10.5
Fall Rye	7 - 37	0.4 - 2.4	20, 44	6.0, 13.2	16	273	110.5
Wheat	26 - 56	1.8 - 3.8	19, 30	5.7, 9.0	12	129	52.2
Total					57	619	250.5

RESULTS AND DISCUSSION

QUALITY OF WORK

Straw and Chaff Handling: Material flow through the spreader was good.

Straw and chaff did not bridge at the impeller inlets and the discharge never plugged. The rubber agitator belts between the shoe and spreader greatly aided chaff movement.

An excessive amount of straw and chaff was directed behind the spreader at the center. Removing the corner deflectors from within the rear hood helped by allowing more straw and chaff to

enter the impellers. The air from the rotor and shoe was deflected upward at the rear of the spreader. This carried fine material 10 ft (3 m) upward behind the combine. A guard placed above the rear of the spreader directed this material toward the ground, greatly reducing chaff around the engine. It is recommended that the manufacturer consider modifications to prevent chaff from blowing up behind the combine.

The discharge height was 42 in (1067 mm) above the ground.

Spreading: Straw and chaff spreading was very 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 operations. Heavy concentrations may also cause slow soil warming, nitrogen depletion or toxic buildup.

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 width.

FIGURE 2 shows the combined straw and chaff spread pattern. It 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 widths are closely matched. APPENDIX II provides a guideline for crop residue ratings.

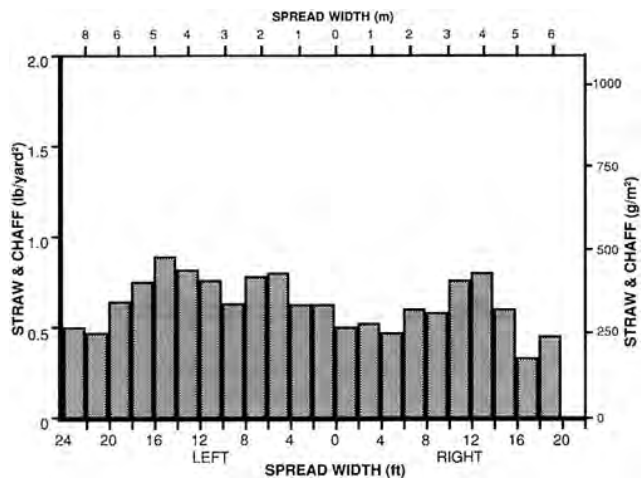


FIGURE 2. Typical Spread Pattern Uniformity for Straw and Chaff Combined.

The Urvold spread in FIGURE 2 shows that straw and chaff could be spread up to 44 ft (13.4 m). Total material concentrations were in the desirable 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 concentrations.

In the field, typical spread widths were up to 30 ft (9.1 m) (FIGURE 3). Most of the material was spread to the sides and no dense rows or heavy concentrations were apparent. Finely chopped straw reduced the spread. The relatively high discharge height also made the spread susceptible to the effects of wind.



FIGURE 3. Typical Spread Pattern.

RATE OF WORK

The Urvold spreader easily handled all material from the Case IH 1680 combine in all crops. Combine MOG feedrates at times were in excess of 1000 lb/min (27.2 t/h), and no plugging or bridging occurred.

*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.

EASE OF OPERATION AND ADJUSTMENT

Installation: Ease of installation was fair.

It took 2 people about 8 hours to install the spreader and drive. The rear axle had to be adjusted to prevent contact between the drive sheave and tire. The mounting brackets were easily attached. The spreader weighed 465 lb (211 kg) and required a lifting device to put in place. Installing and aligning the drive required considerable care.

Specific instructions were not available for mounting the spreader on the Case IH 1680 with a long cleaning system.

Spreader Adjustment: Ease of spreader adjustment was good.

Two fins at the center of the spreader could be set in two positions to adjust the amount of material spread behind the combine. These fins were set in the widest spread positions. A separate deflector could be bolted on the front of the discharge on either side. This deflector would limit the spread on that side. It was not used during the test. Speed was not adjustable.

The spreader was heavy and difficult to remove for windrowing straw. It is recommended that the manufacturer consider modifications to permit easier removal to allow dropping straw for baling.

Combine Adjustment: Ease of combine adjustment was good. The spreader body was hinged and could be swung away from the rear of the combine to provide access to the shoe.

Checking grain loss at the combine was not possible. Individual samples from the shoe or rotor of the Case IH combine could not be collected. It is recommended that the manufacturer consider modifications that would allow checking combine losses.

Servicing: Ease of servicing was very good.

Only the angle drive gearboxes required grease every 75 hours. The drive belt tighteners were spring loaded and required only occasional inspection. The operator's manual did not provide any service instructions.

Cleaning: Ease of cleaning was excellent. The unit could easily be swung out to clean the edges around the impellers.

POWER REQUIREMENTS

The power required to drive the Urvold spreader in tough wheat was 9.5 hp (7.1 kW). The power requirement did not vary significantly with changes in load. Maximum impeller speed was 900 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 Urvold spreader did have three caution decals warning of rotating blades. They were too small to be effective if operating. No safety section or reference was made in the operator's manual.

The relatively high discharge and open discharge requires extreme caution.

OPERATOR'S MANUAL

The operator's manual was unsatisfactory.

The manual provided only installation instructions. No information was provided for operation, maintenance, or safety. The instructions were unclear and the quality of printing and drawings were poor. It is recommended that the manufacturer consider improving installation instructions and providing operation, maintenance, and safety information in the operator's manual.

MECHANICAL HISTORY

The intent of the test was to evaluate functional performance. Extended durability testing was not conducted. No mechanical problems occurred during the 57 hours of field operation.

**APPENDIX I
SPECIFICATIONS**

MAKE:	Urvold Straw and Chaff Spreader
MODEL:	4001
MANUFACTURER:	URVOLD Industries Limited Box 204 Nobleford, Alberta T0L 1S0
DIMENSIONS: (Spreader Body Only)	
-- width	91.2 in (2320 mm)
-- length	47 in (1195 mm)
-- depth	20 in (510 mm)
WEIGHT: (Total)	641 lb (291 kg)
SPREADING SYSTEM:	
-- type	two impellers each with 4 blades, rotating horizontally
-- impeller diameter	31 in (787 mm)
-- impeller height	4.9 in (124 mm)
-- housing diameter	32.2 in (818 mm)
-- outlet area each side	181 in ² (1170 cm ²)
-- drive	belt driven from the combine's rear beater
SERVICING:	
-- 2 gearboxes	require grease every 75 hours
COMBINES AVAILABLE FOR:	Case IH 1440, 1460, 1640, 1660, 1480, 1680

**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
URVOLD STRAW AND CHAFF SPREADER**

RETAIL PRICE	\$3860.00 (July 1991, f.o.b. Lethbridge, Alberta, Model 4001, suitable for mounting on a Case IH 1680 combine).
QUALITY OF WORK	
Straw and Chaff Handling	Good ; straw and chaff deflected upward behind the combine
Spreading	Very Good ; 30 ft (9.1 m) with fine dry straw and chaff; desirable uniformity
RATE OF WORK	Handled all straw and chaff from combine at total MOG feedrates that reached 1000 lb/min (27.2 t/h)
EASE OF OPERATION AND ADJUSTMENT	
Installation	Fair ; unclear instructions, requires a lifting device; quick removal difficult for windrowing
Spreader Adjustment	Good ; usually set for widest spread because of material blown over rear of the spreader
Combine Adjustment	Good ; spreader body swung away from combine; impossible to collect separate loss samples from combine's shoe or rotor
Servicing	Very Good ; grease required at 75 hours
Cleaning	Excellent ; could be easily swung out to clean
POWER REQUIREMENTS	9.5 hp (7.1 kW) in tough wheat
SAFETY	Decals provided were small; no safety information in operator's manual
OPERATOR'S MANUAL	Unsatisfactory ; only provided unclear installation instructions
MECHANICAL HISTORY	No mechanical problems occurred



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