

Evaluation Report

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Delzer-Crary Sunflower Harvesting Attachment

A Co-operative Program Between



DELZER-CRARY SUNFLOWER HARVESTING ATTACHMENT

MANUFACTURER AND DISTRIBUTOR:

Delzer-Crary
 P.O. Box 1779
 Fargo, North Dakota
 58107 U.S.A.

RETAIL PRICE:

\$1,650.00 (March, 1981, f.o.b. Fargo, North Dakota, 3.8 m width with 305 mm row spacing).

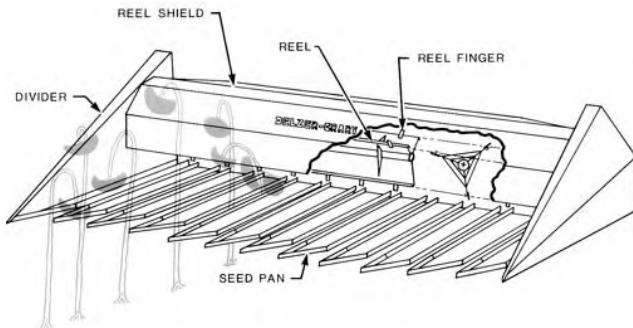


FIGURE 1. Delzer-Crary Sunflower Harvesting Attachment.

SUMMARY AND CONCLUSIONS

Overall functional performance of the Delzer-Crary sunflower harvesting attachment was good. Performance of the reel was fair, while the seed pan performance was very good. Performance of the reel shield was very good.

Crop flow was irregular, as changing crop conditions greatly affected the reel performance. If the sunflower heads were too large, frequent plugging occurred under the reel shield. If the heads were small and dry, severe shattering occurred due to the aggressive action of the reel fingers. Constant monitoring of reel and ground speed was necessary to ensure smooth operation. Speeds up to 6.5 km/h (4 mph) were possible in ideal conditions. Crop losses were acceptable in both dry and tough crops. The seed pans, which covered 78% of the ground area in front of the cutterbar, collected most of the shattered seed in dry crops.

The 305 mm (12 in) seed pan spacing permitted on-row cutting for multiples of this row spacing. These pans were suitable also for cutting continuously seeded crops and cross-cutting of row crops.

Installation was not difficult. A total of 30 man hours was required to install the attachment on the combine header.

No operator manual was provided, however detailed mounting assembly instructions were included. Lubrication was not required.

No serious mechanical problems occurred during the testing.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Manufacturing the left divider and adjacent seed pans shorter, for some pull-type combines, to eliminate tractor tire interference on sharp right turns.
2. Modifying the dividers, to close the open spaces at the ends of the header feed auger, to prevent losses.
3. Mounting the reel fingers at the factory to reduce assembly time.
4. Providing an operator manual complete with installation, operating and safety instructions.

Chief Engineer -- E.O. Nyborg

Senior Engineer -- J.C. Thauberger

Project Engineer -- Gregory R. Pool

THE MANUFACTURER STATES THAT:

With regard to recommendation number:

1. Modification of left divider is under current consideration; it can be made if special ordered.
2. Modification of dividers is under consideration; they should be changed for the 1981 season.
3. The reel fingers are now punched and bolted on. These are not mounted at factory but are mounted by the installer to insure they line up for different size pan widths and header sizes.
4. An owners operating manual is standard; it includes installation, operation and safety instructions.

MANUFACTURER'S ADDITIONAL COMMENTS

The manufacturer considers this a fair and accurate representation of the performance of the Delzer-Crary Sunflower Harvesting Attachment.

Note: This report has been prepared using SI units of measurement. A conversion table is given in APPENDIX III.

GENERAL DESCRIPTION

The Delzer-Crary Sunflower Harvesting Attachment (FIGURE 1) is designed to mount on straight-cut combine headers. It consists of an assembly of seed pans, which attach to the combine cutterbar, two crop dividers, a reel with three rows of metal fingers, and a reel shield in front of the reel. The reel is powered by the combine hydraulic reel drive motor.

The seed pans are spaced to correspond with sunflower row spacing. The sunflower plants pass between the seed pans to the cutterbar, where the heads are severed from the stalks. The reel and reel shield hold the heads down for cutting, to reduce the length of stalk attached to the heads, and deliver the heads to the combine header. The seed pans, which extend ahead of the reel, collect shattered seed that may dislodge during cutting.

The test attachment was 3.8 m (12.5 ft) wide, between divider points, with eleven row openings, spaced at 305 mm (12 in). Attachments with various header widths are available, to suit existing combines. Detailed specifications are given in APPENDIX I.

SCOPE OF TEST

The Delzer-Crary was mounted on an International 914 pull-type combine, with a 3.8 m (12.5 ft) header. It was operated in the conditions shown in TABLE 1 for 21 hours while harvesting about 38 ha (94 ac) of sunflowers, sown at 760 mm and 915 mm (30 and 36 in) row spacing. It was evaluated for ease of installation, quality of work, ease of operation and adjustment, and operator safety.

TABLE 1. Operating Conditions

Row Spacing (mm)	Hours	Field Area (ha)
760	13	24
915	8	14
Total	21	38

RESULTS AND DISCUSSION

EASE OF INSTALLATION

Installation Time: It took about 30 man hours to attach the Delzer-Crary to a combine header, using tools normally found in farm shops. Assembly instructions were included.

Reel: The reel was mounted on sealed bearings in holders attached to the two crop dividers. It was difficult to install the reel through the holes in the dividers because the shafts at both ends were welded to the reel, making it very difficult to insert in between the dividers. Two people were needed because both the reel and the reel shield had to be aligned and mounted simultaneously. A slip clutch and drive chain were supplied with the attachment. The reel fingers had to be welded to the reel bats after installation. It is recommended that the manufacturer consider mounting the reel fingers at the factory, to reduce setup time.

Seed Pans: The seed pans were each fastened to a mounting

bracket, which bolted to the combine header, behind the cutterbar. The pans were also supported from underneath by channel section braces (FIGURE 2), to provide rigidity and to permit vertical adjustment. One end of each brace was bolted to the front of each seed pan, while the other end was fastened to a support bracket bolted to the bottom of the combine header. The braces were easily installed by one person, but two men were needed to install the heavy support bracket.

Dividers: The dividers were easy to install. Two half-width seed pans were attached to the dividers with five bolts. The end pans were fastened to the cutterbar, and the dividers were bolted to the combine reel arms. Shields to protect the reel drive mechanism were bolted to the divider bodies. A large open space resulted at each end of the combine header feed auger, which resulted in some crop losses. It is recommended that the manufacturer consider modifications to the dividers to fill in the spaces at the ends of the feed auger.

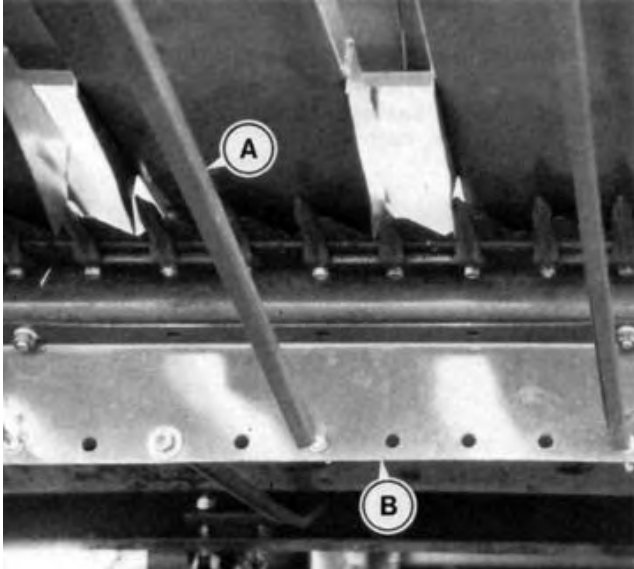


FIGURE 2. Seed Pan Supports: (A) Brace, (B) Support Bracket.

Reel Shield: The reel shield was attached to roller bearings mounted on the reel shafts. Braces at each end of the shield were used to adjust the clearance between the shield and the pans, and also to hold it in place. Two people were needed to mount the shield, which weighed 50 kg (110 lb).

General: All mounting hardware was provided with the attachment. Care had to be taken when ordering, to specify exact inside header width measurement, to avoid difficult modifications after the order was received.

QUALITY OF WORK

Feeding: The flow of crop into the combine was erratic, in fields with varying crop conditions. If adjustments such as reel shield clearance, reel speed and ground speed were carefully synchronized, the feeding action was more smooth and predictable. Plugging often occurred if plant density or head size changed suddenly.

It was important to maintain a reel index* between 0.9 and 1.1, by adjusting the reel drive speed with the hydraulic motor. If reel speed was too great, the metal fingers on the reel caused excessive head damage and shatter losses. On the other hand, frequent plugging occurred, at the reel shield, if reel speed was too slow.

Operating the Delzer-Crary in weedy crops did not affect feeding performance or cause plugging. In some conditions, weeds wrapped around the long fingers welded on the reel bats.

It was important to maintain proper clearance between the reel shield and the pans. If the clearance were too small, large heads would cause plugging, while if it was too large, excessive lengths of stalk were harvested.

Stubble Length: It was best to operate the reel with about 100 mm (4 in) clearance between the reel bats and the cutterbar. This permitted the 50 mm (2 in) reel fingers to run close to the

cutterbar. The maximum stalk, cut off with each head, was about 300 mm (12 in). To maximize combine capacity, the stubble should be as long as possible, with only the sunflower heads fed into the combine. The reel shield helped to ease taller plants down to the level of the seed pans before they were cut off.

Shatter Loss: The seed pans were very effective in reducing seed loss, especially in dry crops. Individual pans were 240 mm (9.5 in) wide, with a 65 mm (2.5 in) space between pans. The seedpans covered 78% of the ground area in front of the reel and cutterbar.

In dry crops, shattering was very significant, increasing the importance of proper ground speed and reel index. Head shattering and seed loss was negligible in crops with high moisture content.

Dividers: Performance of the crop dividers was very good. Their size and shape ensured that very few sunflower plants were pushed down while the crop was harvested.

EASE OF OPERATION AND ADJUSTMENT.

Row Spacing: Tests were conducted in sunflowers seeded at 760 mm and 915 mm (30 and 36 in) row spacings. Although the 305 mm (12 in) seed pan spacing permitted on-row cutting for multiples of this row spacing, there was little need to closely follow rows. This spacing was also suitable for continuously seeded crops, or for cutting row crops at an angle or across headlands. When not following rows, the seed pan points occasionally knocked down some large sunflower plants.

Turning: When mounted on an IH 914 combine, right turns required a great deal of care, to prevent interference between the tractor tire and the left divider. It is recommended that the left divider and the two seed pans adjacent to it, be manufactured shorter than the regular pans, for mounting on this and similar pull-type combines.

Seed Pans: The seed pan angle was easy to adjust, with the threaded rods on the end of the seed pan braces. The pans required only minor adjustments during the test. Total time required to adjust all the pans was about 20 minutes. It was important to have the seed pans sloping toward the combine header to permit the collected seeds to flow back into the combine. It was also important to have all the pans at the same height, to prevent sunflower heads from falling between the pans.

Seed pan vibration effectively conveyed the collected seeds into the combine. Operation on rough fields did not cause excessive bouncing of the seed pans. Cutting ability and feeding characteristics were not affected by field roughness.

Reel Drive: The reel drive chain, on the right side of the header, was well shielded from the standing sunflower crop. The shield prevented the sunflower plants from engaging the drive chain and sprockets. Due to the length of the chain needed to drive the reel (FIGURE 3) care had to be taken to periodically adjust the idler sprocket to prevent excess chain slackness. A mechanical slip clutch on the reel shaft, protected the drive mechanism in the event of reel plugging.



FIGURE 3. Reel Drive Chain.

Unhooking: The complete combine header assembly, with the Delzer-Crary in place, was easily unhooked from the combine, and

* Reel Index is the ratio of reel tip speed to forward travel speed.

placed on the ground without damage to the machine.

Lubrication: No lubrication was required on the Delzer-Crary, as the reel and reel shield brackets were both mounted on sealed bearings.

OPERATOR SAFETY

The Delzer-Crary was safe to operate provided normal safety procedures were followed. Limited safety instructions were provided with the assembly instructions. No safety decals were supplied.

OPERATOR MANUAL

No operator manual was available, for the Delzer-Crary, although very detailed assembly instructions were provided. These were clearly written, and provided some useful information on operation, adjustments and safety. It is recommended that a suitable manual be provided, complete with operating and safety instructions.

DURABILITY RESULTS

The Delzer-Crary sunflower harvesting attachment was operated in the field for 21 hours, while harvesting about 38 ha (94 ac) of sunflowers. The intent of the test was functional evaluation. No extended durability evaluation was conducted. No mechanical problems occurred during testing, however an idler sprocket was installed on the reel drive to maintain drive chain tension.

APPENDIX I SPECIFICATIONS

Make:	Delzer-Crary
Model:	11 row, 305 mm spacing
Overall Dimensions:	
-- length	1900 mm
-- width	4200 mm
-- height	<u>980 mm</u>
Total Weight:	332 kg
Feeding System:	
-- type	seed pans and drum reel with shield
-- attachment	to straight-cut combine header
Seed Pans:	
-- length	1600 mm
-- width	240 mm
-- depth	35 mm
Reel:	
-- length	3480 mm
-- diameter, drum only	440 mm
-- effective diameter, with fingers	540 mm
-- number of fingers per row	3
-- drive	chain and sprocket from hydraulic motor
Options:	
-- stalkwalker and various header widths	

APPENDIX II MACHINE RATINGS

The following rating scale is used in PAMI Evaluation Reports:

(a) excellent	(d) fair
(b) very good	(e) poor
(c) good	(f) unsatisfactory

APPENDIX III CONVERSION TABLE

1 metre (m)	= 3.3 feet (ft)
1 millimetre (mm)	= 0.04 inches (in)
1 kilogram (kg)	= 2.2 pounds mass (lb)
1 kilometre/hour (km/h)	= 0.6 mile/hour (mph)
1 hectare (ha)	= 2.5 acres (ac)



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