

Evaluation Report

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Headsnatcher Sunflower Harvesting Attachment

A Co-operative Program Between



HEADSNATCHER SUN FLOWER HARVESTING ATTACHMENT

MANUFACTURER AND DISTRIBUTOR:

General Dryer Corporation
Clarkfield, Minnesota
U.S.A. 56223

RETAIL PRICE:

\$2,950.00 (July, 1980, f.o.b. Clarkfield, Minn., 3.8 m width with 380 mm row spacing).

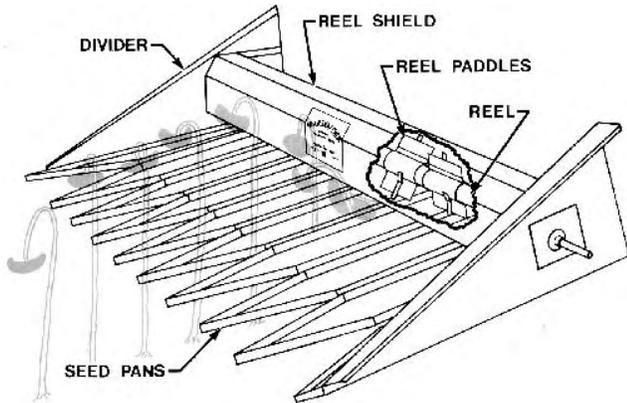


FIGURE 1. Headsnatcher Sunflower Harvesting Attachment.

SUMMARY AND CONCLUSIONS

Overall functional performance of the Headsnatcher sunflower harvesting attachment was very good. Performance of the reel was excellent while the seed pan performance was very good. Performance of the stalkwalker was very good.

Crop flow was smooth, as long as ground speed was properly synchronized with the single available reel speed. If ground speed was too high, occasional cutterbar plugging occurred, while if ground speed was too low, some head shattering occurred in dry conditions. Capacity of the Head-snatcher could be increased by using a variable speed drive, to permit adjustment of the reel speed, to suit crop conditions.

Crop losses were acceptable in both dry and tough crops. The seed pans, which covered 81% of the ground area in front of the cutterbar, collected most of the shattered seed in dry crops.

The 380 mm (15 in) seed pan spacing permitted on-row cutting for 380 mm (15 in) and 760 mm (30 in) row spacing. These pans were also suitable for cutting continuously seeded crops and cross-cutting of row crops.

Installation was easy. Total installation time was about 25 man-hours.

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

No serious mechanical problems occurred during testing.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Manufacturing the left divider and two seed pans shorter than the others, for pull-type combines, to eliminate tractor tire interference on sharp right turns. Supplying a shield to protect the reel drive from the standing sunflower crop.
2. Mounting the reel paddles on the reel at the factory to reduce set-up time.
3. Providing an operator's 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. We have no plans to shorten the pans, due to potential crop loss to customers, because of the way the bumper pushes the heads down. We can only suggest that owners of pull-type combines make slightly longer turns.
2. Owners have not indicated a need for such a shield, and they are not needed with hydraulic motor type drives, but we may consider this as an option in future.
3. This suggestion has been considered many times in the past. Experience has shown that the assembly, shipping and production problems offset the problem of the customer mounting the paddles.
4. We are constantly changing and improving our book. The 1980 version has many improvements.

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

GENERAL DESCRIPTION

The Headsnatcher Sunflower Harvesting Attachment (FIGURE 1) is designed to mount on straight-cut combine headers. It consists of seed pans, which attach to the combine cutterbar, dividers, a bottom mounted stalkwalker, a reel with double paddles, and a reel shield in front of the reel. The reel and stalkwalker were powered by the combine reel drive.

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 stalkwalker, reel and reel shield hold the heads down for cutting, and deliver the cut heads to the combine header. The seed pans, which extend ahead of the reel, collect shattered seed that may dislodge during cutting.

The attachment tested was 3.8 m (12.5 ft) wide, between divider points, with nine row openings, spaced at 380 mm (15 in). Attachments with various header and seed pan widths are available, to suit existing combines and cultural practices. Detailed specifications are given in APPENDIX I.

SCOPE OF TEST

The Headsnatcher 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 30 hours while harvesting about 65 ha (160 ac) of sunflowers, sown at 760 mm (30 in) row spacing. It was evaluated for ease of installation, quality of work, ease of operation and adjustments and operator safety.

TABLE 1. Operating Conditions

Crop Type	Soil Conditions	Hours	Field Area	
			ha	ac
Open Pollinated	Loamy Sand	20.5	45	110
Hybrid	Clay Loam	5.5	12	30
Hybrid	Clay	4.0	8	20
Total		30.0	85	160

RESULTS AND DISCUSSION

EASE OF INSTALLATION

Installation Time: It took about 25 man hours to attach the Headsnatcher to the combine header, using tools normally found in most farm shops. Clear assembly instructions were provided which made installation easy.

Reel: The reel was mounted on sealed bearings that were attached to the two crop dividers. The shafts in the ends of the reel had to be adjusted for length before attachment to the reel. All paddles had to be bolted to the reel during assembly. Since twelve nuts and bolts per row were needed, this took a great deal of time. It is recommended that the reel paddles be mounted on the reel at the factory to reduce set up time. With all paddles in place, the reel weighed 86 kg (190 lb), which made two people necessary to install it easily.

Seed Pans: The seed pans were each fastened to the cutterbar with three long carriage bolts. Each pan was also supported from underneath by two angle iron braces (FIGURE 2), to provide rigidity and to permit vertical adjustment. One end of each brace was bolted at the front of each seed pan, while the other end was fastened to a long support bracket bolted to the combine header frame. The braces were easy to install by one person, but two men were needed to install the support bracket.

Dividers: The dividers were difficult to install. The half seed pans on each end were attached to the dividers with six bolts. The seed pans were bolted to the cutterbar, and the dividers were bolted to the combine header and reel arms. The outside reel shields were attached to the main divider bodies with another six bolts each.

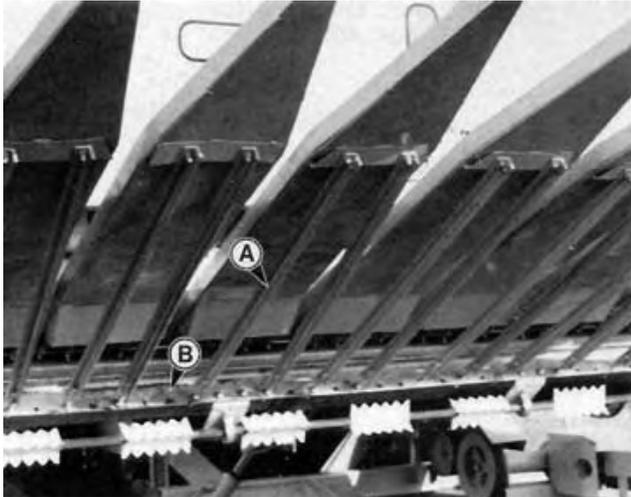


FIGURE 2. Seed Pan Supports: (A) Braces, (B) Support Bracket.

Due to installation difficulties with the International Harvester pull-type combine header, both the reel and the stalkwalker had to be driven from the right side. This required that the reel shaft extend 200 mm beyond the edge of the divider on the right side. To protect the drive mechanism from the standing crop, a special shield had to be manufactured and installed as the shield supplied by the manufacturer was not adaptable to this drive arrangement.

Shield: The reel shield was attached to roller bearings that were 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. Due to its weight of 66 kg (145 lb), two people were required to mount the shield.

Stalkwalker: The stalkwalker was easy to install, provided that the installation instructions were carefully followed. The stalkwalker teeth required nine nuts and bolts for each row. Specially designed bearings supported the hex shaft in five places. Roller chain and sprockets were supplied to drive the stalkwalker and reel.

QUALITY OF WORK

Feeding: The flow of crop into the combine was smooth, as long as ground speed was properly synchronized with the single available reel speed. It was important to maintain a reel index* between 0.9 and 1.1. At high ground speeds, with the reel index less than 0.9, the reel could not effectively clear the crop from the cutterbar, resulting in occasional plugging in heavy crops. At lower ground speeds, with the reel index greater than 1.1, the reel was too aggressive, causing some shatter loss and head damage.

Operating the Headsnatcher in weedy crops did not affect feeding performance or cause plugging. Wrapping of weeds on the stalkwalker could occur if suitable weed conditions existed.

The 25 tooth drive sprocket and the 27 tooth sprocket on the reel provided a reel speed of 100 rpm which gave a working speed range of 8.1 to 9.9 km/h (5.0 to 6.2 mph), within the suitable range of reel indices. This did not provide an adequate working speed range for most crop conditions. Capacity of the Headsnatcher could be increased by using a variable speed reel drive to permit adjusting the reel speed to suit crop conditions.

Stubble Length: For uniform feeding, the reel was operated with about 75 mm (3 in) clearance between the reel paddles and the cutterbar. The 45 mm (2 in) reel fingers allowed the reel to run close to the cutterbar. The amount of stalk cut off with each head was about 300 mm (12 in) or less, depending on crop conditions. To maximize combine capacity, the stubble should be as long as possible, with only the sunflower heads fed into the combine. The Headsnatcher attachment was also equipped with a reel shield, which helped gently ease the taller plants down to the level of the seed pans, before they were cut off.

Another feature of the Headsnatcher was the stalkwalker, which also helped to leave longer stubble (FIGURE 3). Rotating at 225 rpm and located underneath the cutterbar, the serrated teeth of the stalkwalker pulled the tall plants down to the cutterbar as the combine moved forward. Performance of the stalkwalker was very good.



FIGURE 3. Stalkwalker.

Shatter Loss: The seed pans were very effective in reducing seed loss, especially in dry crops. Individual pans were 310 mm (12 in) wide, with a 70 mm (3 in) space between pans. The seed pans covered 81% of the ground area in front of the reel and cutterbar.

In dry crops, shattering can be very significant, and maintaining a proper ground speed is very important in reducing shatter loss. The loss was very dependent on the moisture content of the crop. Head shattering and seed losses were negligible in tough crops.

Dividers: Performance of the crop dividers was very good. The left divider worked very well. Due to installation difficulties, a special shield had to be made by PAMI, which altered the shape of the right divider. Performance was best when travelling along the rows, otherwise, the divider knocked over some crop.

EASE OF OPERATION AND ADJUSTMENT

Row Spacing: All tests were conducted in sunflowers seeded at 760 mm (30 in) row spacing. Although the 380 mm (15 in) seed pan spacing on the Headsnatcher permitted on-row cutting for 380 mm (15 in) and 760 mm (30 in) row spacings, this seed pan spacing was also suitable for cutting continuously seeded crops, or for cross-cutting of row crops. When not following rows, the seed pan points occasionally knocked down some large sunflower plants.

Turning: With the Headsnatcher mounted on a pull-type combine, right turns required a great deal of care, to prevent interference with the right tractor tire. The tire did contact the left divider once during the test.

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 some 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 two braces on each pan were adjusted individually to change the pan angle and gap spacing. The pans required only minor adjustments during the test. The total time required to adjust all pans was approximately 20 minutes for one man. It was important to have the seed pans sloping toward the combine header, to permit the collected seeds to be conveyed into the combine. It was also important to have all pans at the same height, to prevent sunflower heads from falling between the pans.

Seed pan vibration was desirable to convey collected seeds into the combine. Operation on rough fields caused considerable vibration of the seed pans, however no failures occurred. Cutting ability and feeding characteristics were not affected by field roughness.

Reel Drive: The reel drive chain, on the right side of the header,

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

was exposed to the standing sunflower crop. The stalkwalker drive chain was also on the right side of the combine. A PAMI drive shield (FIGURE 4) was installed to cover and protect the drive chains. It is recommended that the manufacturer supply a suitable shield as part of the divider assembly. A mechanical slip clutch on the reel shaft protected the drive mechanism in the event of reel or stalkwalker plugging.

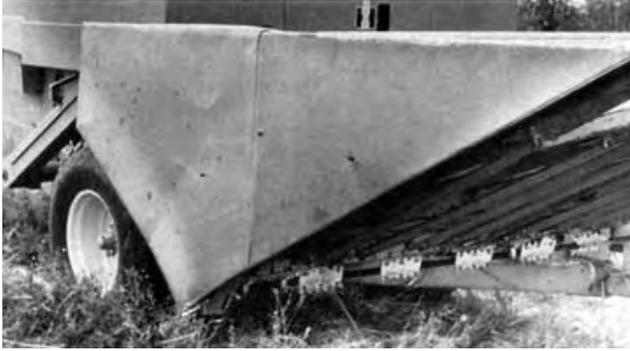


FIGURE 4. PAMI Drive Shield.

Stalkwalker: The stalkwalker performed well in all crop conditions. No wrapping of weeds or plugging occurred during testing. Some difficulty was experienced with the drive chain, which occasionally came off due to insufficient tightness. A small shield was provided which protected the drive chain from most sunflower stalks.

Unhooking: The complete combine header assembly, with the Headsnatcher in place, could be unhooked easily from the combine and placed on the ground without damage. Care had to be taken, though, that the stalkwalker mounting brackets were not bent when the header was set down or transported on a trailer.

Lubrication: No lubrication was required on the Headsnatcher. The reel, reel shield, and stalkwalker were mounted entirely on sealed bearings.

OPERATOR SAFETY

The Headsnatcher was safe to operate provided normal safety procedures were followed. Limited safety instructions were provided with the assembly instructions, but no safety decals were supplied.

OPERATOR'S MANUAL

No operator's manual was available for the Headsnatcher, although very detailed assembly instructions were provided. The assembly instructions were very clearly written and provided much useful information on operation, adjustments and safety. It is recommended that a suitable manual be provided complete with operating and comprehensive safety instructions.

DURABILITY RESULTS

The Headsnatcher sunflower harvesting attachment was operated in the field for 30 hours, while harvesting about 65 ha (160 ac) of sunflower. The intent of the test was functional evaluation and no extended durability evaluation was conducted. No mechanical problems occurred during testing, however the right rear tractor tire bent the left divider and the span adjacent to it while making a sharp right turn.

APPENDIX I SPECIFICATIONS	
Make:	Headsnatcher
Model:	9 row, 380 mm spacing
Overall Dimensions:	
-- length	2050 mm
-- width	3700 mm
-- height	760 mm
Total Weight:	430 kg
Feeding System:	
-- type	seed pans and paddle reel w/shield attachment to straight-cut combine header
Seed Pans:	
-- width	310 mm
-- length	1830 mm
-- depth	55 mm
Reel:	
-- length	3350 mm
-- diameter drum	125 mm
-- with fingers	470 mm
-- number of fingers per row	2
-- speed	100 rpm
-- drive	chain drive from combine header
Stalkwalker:	
-- length	3810 mm
-- number of bearings	5
-- diameter	100 mm
-- drive	chain and sprocket
Options:	
--	3050 mm to 7315 mm width units
--	380 mm, 535 mm, 700 mm, 915 mm and 990 mm row widths.
--	pickup rods for lodged sunflowers

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)

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