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Evaluation Report 541

Cereal Implements Model 1203 Chinook Seeding & Fertilizing System

A Co-operative Program Between
ALBERTA FARM MACHINERY RESEARCH CENTRE
PAMI
PRAIRIE AGRICULTURAL MACHINERY INSTITUTE

CEREAL IMPLEMENTS MODEL 1203 CHINOOK SEEDING AND FERTILIZING SYSTEM

MANUFACTURER:

Vicon Western Canada
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Portage la Prairie, Manitoba
R1N 3R3

DISTRIBUTOR:

Cereal Implements
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Portage la Prairie, Manitoba
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RETAIL PRICE: March, 1988, f.o.b. Lethbridge.

a) 1203 Chinook - list price $37,667.00
includes Loading Auger, 35 Outlet Distribution System Rear Hitch for Chisel Plow or Field Cultivator and Dual Purpose Seed Boots.

b) 807 Chisel Plow - list price $22,526.00
complete 35 ft. Chisel Plow including Tine Harrows and 16 inch Sweeps.

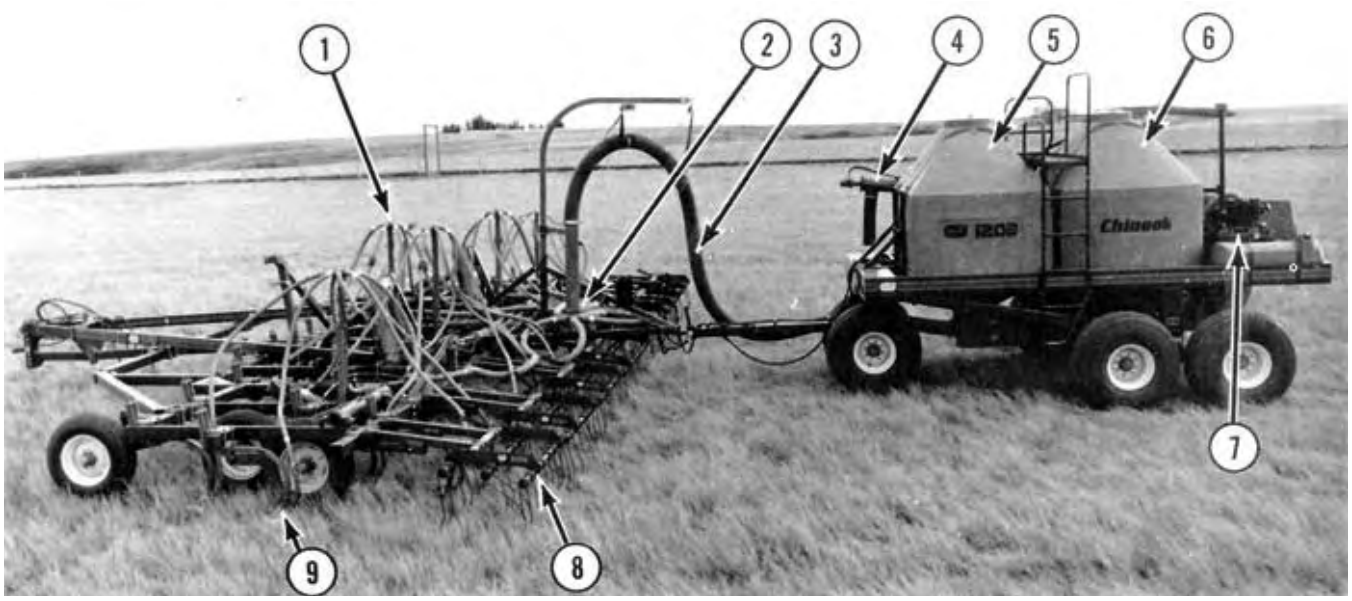

FIGURE 1. Cereal Implements Model 1203 Chinook Seeding and Fertilizing System: (1) Secondary Headers, (2) Primary Headers, (3) Primary Hose, (4) Optional Loading Auger (5) Grain Tank, (6) Fertilizer Tank, (7) Air Cooled Diesel Engine, (8) Mounted Tire Harrows, (9) Seed Boot.

SUMMARY

Quality of Work: The Chinook 1203 Model was mounted on a 35 ft (10.7 m) CI 807 heavy duty cultivator. Penetration and seed placement was good in most eld conditions. Plants emerged in distinct rows in band widths ranging from 3.2 to 6.2 in (81 to 157 mm). This spacing provided adequate windrow support. When used with the CI 807, there was very good trash clearance.

The grain charts were updated to coincide with the new seed auger. The manufacturer's metering system calibration charts were acceptable for fertilizer. Operating on slopes (up to 10 degrees), variations in ground speed, fan speed and eld bounce had little effect on metering rates. The distribution uniformity and grain damage was acceptable in all materials tested. The maximum fertilizer application rate at 5 mph (8 km/h) was 280 lb/ac (318.2 kg/ha).

Ease of Operation and Adjustment: Seeding and fertilizer rates were easy and simple to adjust. Tank and meter cleanout convenience was good. Tank lling required the use of an auger or drill ll. A total of four grease ttings on the applicator required greasing. Since the applicator was towed behind the cultivator, operator visibility of the cultivator was not obstructed by the tanks. The Chinook 1203 with C1807 heavy duty chisel plow could be placed in transport position in less than ve minutes.

Ease of Installation: Ease of installing the distribution and monitoring system was fair. It took two people approximately 12 hours to install the system.

Operator Safety: The Model 1203 Chinook air seeder was safe to operate, provided normal safety procedures were observed.

Operator's Manual: The operator's manual was very good, containing useful information on adjustments, maintenance and operations. A detailed parts list was also included.

Mechanical Problems: A number of mechanical problems and manufacturer modi cations occurred during the evaluation. When tightening the front meter idler sprocket, the sprocket twisted the idlers' support frame. Numerous seed boot de ectors were bent and the support frame for the primary hose was bent.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Modifying the auger hopper to reduce the amount of material left in the hopper by the auger after lling the tanks.
2. Modifying the primary hose coupler assembly to allow for quick and easy connections.
3. Balancing the cultivator so that an operator can safely hitch and unhitch the unit from his tractor.
4. Reinforcing the frame which the idler sprocket is secured to ensure the sprocket will run parallel to the auger sprocket.
5. Modifying the primary hose support bracket to eliminate the interference between the bracket and front castor wheels.

Station Manager: R. P. Atkins
Project Technologist: G. A. Magyar

THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. The auger hopper used on the 1203 Loading Auger is a standard hopper used with many commercial grain augers. The sliding gate over the auger bottom does reduce the amount of material in the hopper but your recommendation for an improved design of hopper will be considered to reduce that amount.
2. The primary hose is connected with three latches, but design improvements are being considered to further improve ease of use of the coupler assembly.
3. Operator safety is a major concern. The wheels on the chisel Plow are positioned in the middle of the shanks to optimize front to back depth control. Hitch weight does become negative with the added rear weight of the tine harrows, rear hitch and distribution system. Decals and the Operator's Manual warn the operator of this hazard. Machine operators usually lower the chisel plow onto its shanks or use a jack and blocks to support the rear weight. Your recommendation is being considered to further improve safety and operator convenience.
4. The manufacturer feels this was an isolated incident as this has not been a reported problem, but the machine performance will continue to be monitored.
5. The problem was addressed with a service bulletin and the design has been changed on current and future production to eliminate the interference problem.

Additional Manufacturer's Comment:

The criteria for capacity tests for fertilizer included using only one meter. The capacity results for the 1203 Chinook with a 35 ft. machine width are quite adequate for application of fertilizer with seed. Our own laboratory tests and eld experience indicate much higher rates when using both meters as would be the case for banding. We have experienced eld application rates as high as 350 lb/ac at 6.5 mph on a 40 ft. machine. Maximum capacity will also vary between distribution systems and with different fertilizer types.

GENERAL DESCRIPTION

The Cereal Implements Model 1203 Chinook seeding and fertilizer system is a pneumatic seed and fertilizer applicator designed for use with varying makes and models of cultivators. The applicator is supported by six wheels mounted on tandem walking beam axles and tows behind the cultivator. Seed and fertilizer are pneumatically distributed from the two tanks through a network of tubes to seed boots attached to the rear of the cultivator shanks. The applicator can .be used for seeding, for combined seed and fertilizer application and for fertilizer banding.

Seed and fertilizer is metered through two variable speed metering augers mounted below each tank. Each meter is driven by a hydrostatic transmission which is powered by the air-cooled diesel engine. An actuator assembly is used to vary the speed of the auger. The diesel engine powers the fan to convey the metered material through the distribution system. The distribution system consisted of a ve-port primary header feeding 5, seven-port secondary headers. Tubes from the secondary headers connect to the seed boots.

The test machine was used with a Cereal Implements Model 807 heavy duty chisel plow (PAMI Evaluation Report #550). This chisel plow was 35.5 ft (10.8 m) wide, with a 13.8 ft (4.2 m) center frame and two, 10.8 ft (3.3 m) wing sections. It was equipped with 35 spring cushion shanks spaced at 12 in (305 mm) and arranged in four rows on the main frame and three rows on the wings. The chisel plow was equipped with optional three-row mounted harrows and rear hitch for towing the applicator. The test machine was also equipped with an electronic monitoring system and a loading auger which was hydraulically driven from the tractor. A tractor with three remote hydraulics was required to operate the Model 1203 Chinook applicator with the Model 807 heavy duty chisel plow.

Additional equipment available included a hitch for the CI Model 204 chisel plow and Model 279 eld cultivator and distribution systems for 25 to 90 outlets.

SCOPE OF TEST

The Model 1203 Chinook seeding and fertilizing system was operated in loam, silty clay loam, silty clay, clay loam, silt loam and sandy loam soils in the eld conditions shown in TABLE 1 for approximately 130 hours while processing about 2430 ac (984 ha). It was evaluated for quality of work, ease of operation and adjustment, power requirements, safety and suitability of the operator's manual. In addition the seed and fertilizer metering systems were calibrated in the laboratory.

TABLE 1. Operating Conditions.

MATERIAL	SOIL TYPE & CONDITION	STONE CONDITIONS	FIELD AREA		HOURS
			ac	ha	
Fertilizer	Silty Clay Loam - Secondary	Stone Free	400	162	25.0
	Loam - Secondary	Stone Free	200	81	12.5
	Silty Clay Loam - Primary	Stone Free	200	81	12.5
Canola	Silty Clay Loam - Primary	Stone Free	300	121	13.6
	Loam - Secondary	Stone Free	60	24	2.7
Barley	Loam - Secondary	Occasional stones	80	32	4.0
	Silty Clay Loam - Secondary	Occasional stones	230	130	11.5
	Clay Loam - Secondary	Very stony	480	194	24.0
Wheat	Silty Loam - Primary	Occasional stones	200	81	10.5
Winter Wheat	Silty Loam - Secondary	Stone Free	160	65	8.0
	Silty Loam - Primary	Occasional stones	120	49	5.7
TOTAL			2430	984	130.0

RESULTS AND DISCUSSION

QUALITY OF WORK

Seed Placement: The seed placement of the Model 1203 Chinook seeding and fertilizing system was good. The Model 1203 was equipped with a v-shaped seed boot (FIGURE 2) to spread material behind the cultivator sweep. Plants emerged in distinct rows in band widths ranging from 3.2 to 6.2 in (81 to 157 mm). With a 12 in (305 mm) cultivator shank spacing, distances between rows varied from 5.8 to 8.8 in (147 to 223 mm). The row spacing provided adequate windrow support, provided light crops were laid across the rows rather than parallel to them.

Careful levelling of the cultivator frame was important in obtaining uniform plant emergence across the cultivator width. Uniform seed depth placement was best obtained by comparing the seed depth of several shanks across the cultivator width and comparing the front and rear shank rows.

On level and gently rolling elds, vertical seed distribution was quite uniform. For example, at an average seeding depth of 2 in (51 mm), seeding depth across the width of the machine varied from 1.5 to 2.7 in (38 to 69 mm) with most of the seeds placed within 0.5 in (13 mm) of the average cultivator sweep working depth. This compares to seed being placed within 0.5 to 0.6 in (12 to 15 mm) from average seeding depth for a hoe drill in similar conditions. Working in elds with hill crests or gullies, seed depth variation was greater because of the wide distances between shank rows. Frame levelling should be checked and appropriate depth adjustments made when changing elds to ensure adequate, uniform seed coverage.

Soil Finishing: The Model 1203 Chinook with the Model 807 chisel plow left the seedbed in very good condition. Towing with the applicator behind the cultivator caused the seedbed to be packed rmly in the wheel tracks. The applicator did not over pack the seedbed in normal seeding conditions encountered during the test. Packing in moist clay soils could be a problem. The soil contact pressure due to the applicator's tires ranged from 24 to 27 psi (165 to 186 kPa). For comparative purposes, an unloaded pickup truck has an approximate soil pressure of 30 psi (207 kPa). Mounted harrows were effective in smoothing the soil surface and breaking soil lumps. Harrows also increased weed kill by loosening weeds. The air seeder was not equipped with packers. Since it was considered essential to level and pack elds seeded with the unit, a packer drawbar or harrow packer drawbar was used as a follow-up operation. The packer or harrow-packer combination served to smooth and pack the seedbed, leaving packer ridges from 1 to

1.3 in (25 to 33 mm). To obtain a smooth rm seedbed in dry conditions required packer-drawbar operations in two directions. Care had to be used in moist conditions to avoid over-packing the seedbed.

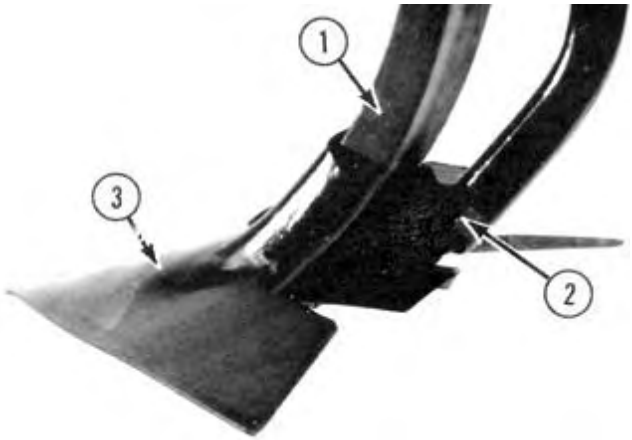

FIGURE 2. Model 1203 Chinook Seed Boot: (1) Shank, (2) Seed Boot, (3) Sweep.

Metering Accuracy: The metering rate was varied by reprogramming a new meter rate setting into the controller. A value was programmed into the controller for each meter. By increasing or decreasing the rate setting a higher or lower metering rate was available. Calibration curves for wheat, barley, canola, and fertilizer are given in FIGURES 3 to 6. The calibration curves for wheat, barley and canola were updated to re ect the change to the seed auger.

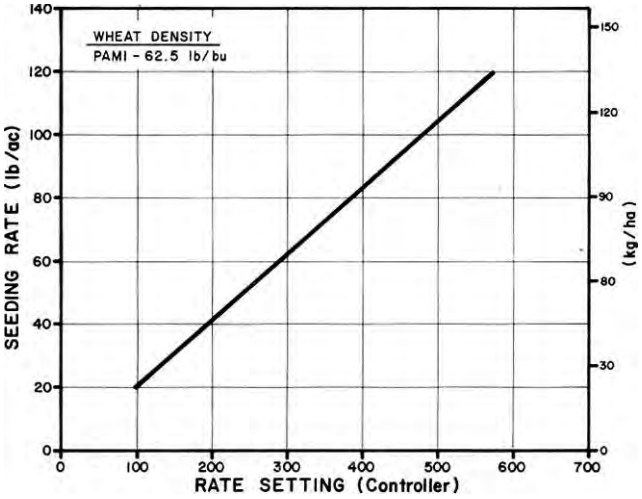

FIGURE 3. Metering Accuracy in Wheat.

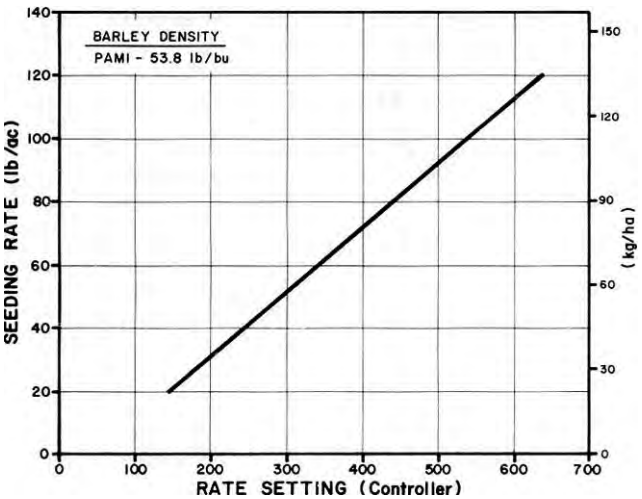

FIGURE 4. Metering Accuracy in Barley.

Accuracy of the manufacturer's metering system calibration charts in fertilizer was good. Over a range of application rates PAMI's measured rates in 11-51-00 fertilizer were 8.5% lower for both tanks. When operating on slopes (up to 10 degrees), variations in ground speed, fan speed and eld bounce had little effect on metering rates.

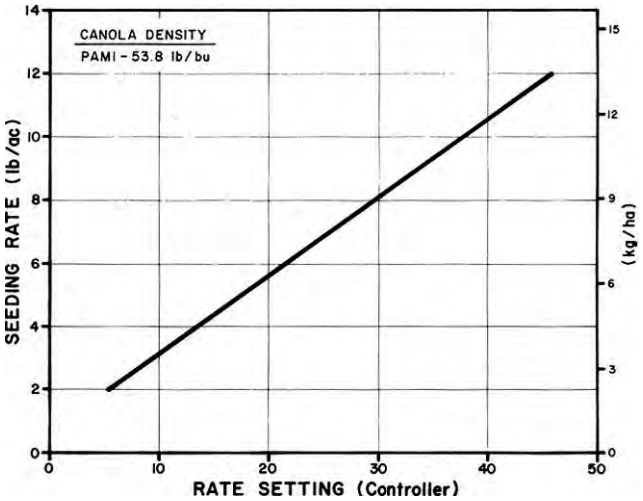

FIGURE 5. Metering Accuracy in Canola.

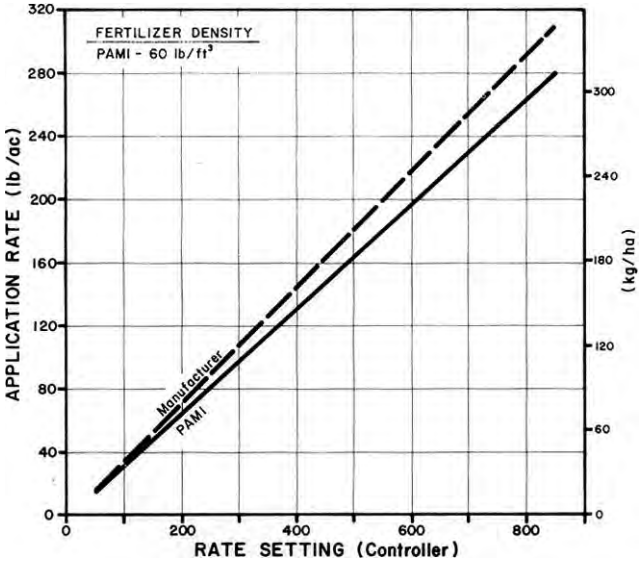

FIGURE 6. Metering Accuracy in Fertilizer.

Distribution Uniformity: FIGURE 7 gives seeding distribution uniformity for the Model 1203 Chinook in wheat and barley. Distribution uniformity was rated as very good over the full range of seeding rates at a fan speed set for the desired rate. For example, at a seeding rate of 78.5 lb/ac (89.2 kg/ha), the coef cient of variation (CV)[1] was 4.2% for wheat and at a seeding rate of 72.7 lb/ac (82.6 kg/ha) the coef cient of variation was 4.5% for barley.

FIGURE 8 shows a typical seeding distribution pattern obtained in wheat at a seeding rate of 78.5 lb/ac (89.2 kg/ha). The seeding rate from each shank across the width of the air seeder varied from 70.7 to 89.5 lb/ac (79.4 to 100.6 kg/ha). This resulted in acceptable distribution uniformity with a CV of 4.2%.

FIGURE 9 shows a typical distribution pattern obtained in canola at a seeding rate of 6.5 lb/ac (7.4 kg/ha), which resulted in acceptable distribution uniformity with a CV of 12.6%.

Distribution uniformity was acceptable over the full range of canola seeding rates with CV's ranging from 12.6 to 14.6% (FIGURE 10).

[1]The coef cient of variation (CV) is the standard deviation of seeding rates from individual shanks expressed as a percent of the average seeding rate. An accepted variation for seeding grain or applying fertilizer is a CV value not greater than 15%. If the CV is less than 15%, distribution is acceptably uniform, whereas if the CV is greater than 15%, the variation in application rate among individual shanks is excessive.

Distribution uniformity in 11-51-00 fertilizer was acceptable over the full application range with a CV ranging from 8.1 to 12.4% (FIGURE 11).

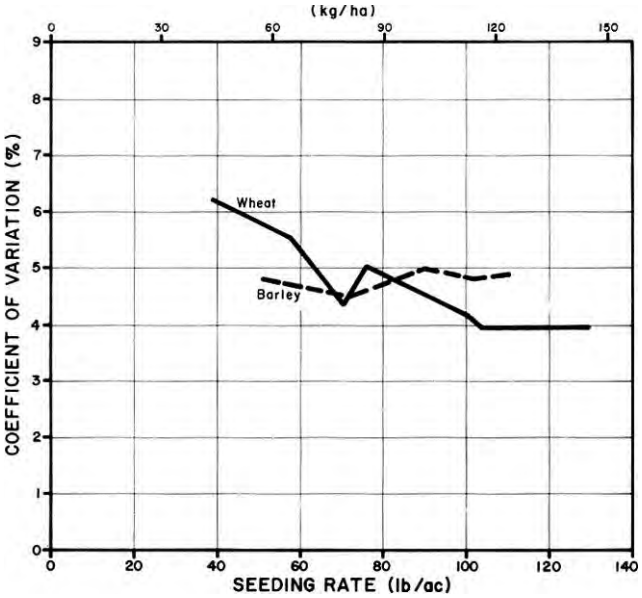

FIGURE 7. Distribution Uniformity in Cereal Grains over a Range of Seeding Rates at 5.0 mph (8 km/h) at Varying Fan Speeds.

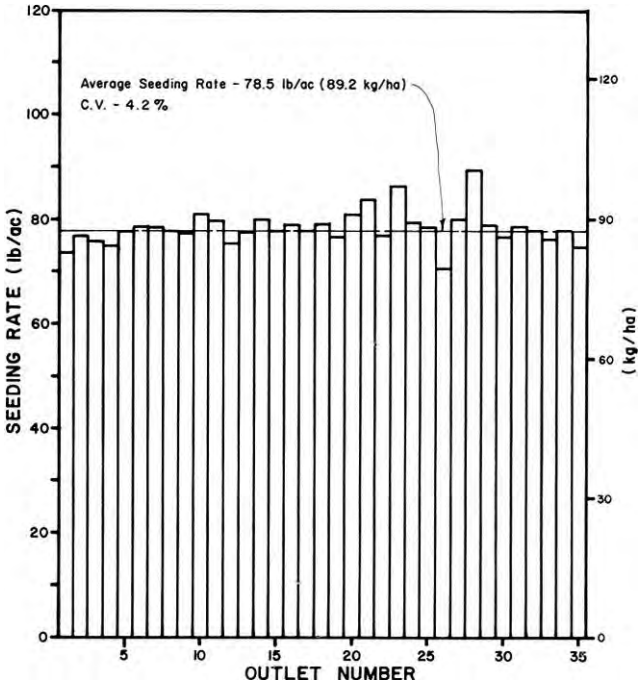

FIGURE 8. Distribution Uniformity Pattern in Wheat at 78.5 lb/ac (89.2 kg/ha) at a Fan Speed of 2100 rpm.

Changes in distribution pattern uniformity could occur at different forward speeds or for different machine widths due to different volumes of material being introduced into the constant volume of air supplied by the fan.

Changes in fan speed and operation in hilly terrain had only a small effect on distribution uniformity.

Grain Damage: Grain damage by the metering and distribution system was within acceptable limits for cereal grains at varying fan speeds. For example, in dry Neepawa wheat, at a 12.3% moisture content and at a fan speed of 2050 rpm only 0.7% grain crackage occurred. Grain crackage in canola was slightly higher than in cereal grains. For example, in dry canola at a moisture content of 8.1%, crackage at a fan speed of 2000 rpm was 2.0%.

Fertilizer Banding: The Model 1203 Chinook air seeder could be used for two types of fertilizer applications. It could be used for normal fertilizer application at seeding time by metering fertilizer from one tank and grain from the other tank. Both products are applied through the same seed boot. When equipped with chisel points or sweeps (FIGURE 12), the Unit could be used for fertilizer banding. No special banding boot was required; when the v-shaped spreader was removed the general all-purpose boot served as the banding boot. When banding in secondary and primary eld conditions fertilizer granules were placed in a band about 1 in (25 mm) wide, with fertilizer depth ranging from chisel tip depth to 0.5 in (13 mm) above chisel tip depth. Wider fertilizer bands were obtained in lumpy soil conditions. When using the front or rear meter only, and maintaining an acceptable distribution uniformity fertilizer application rates of 280 lb/ac (318.2 kg/ha) were possible. When using both tanks a maximum application rate of 320 lb/ac (359.6 kg/ha) was possible at a ground speed of 5 mph (8 km/h).

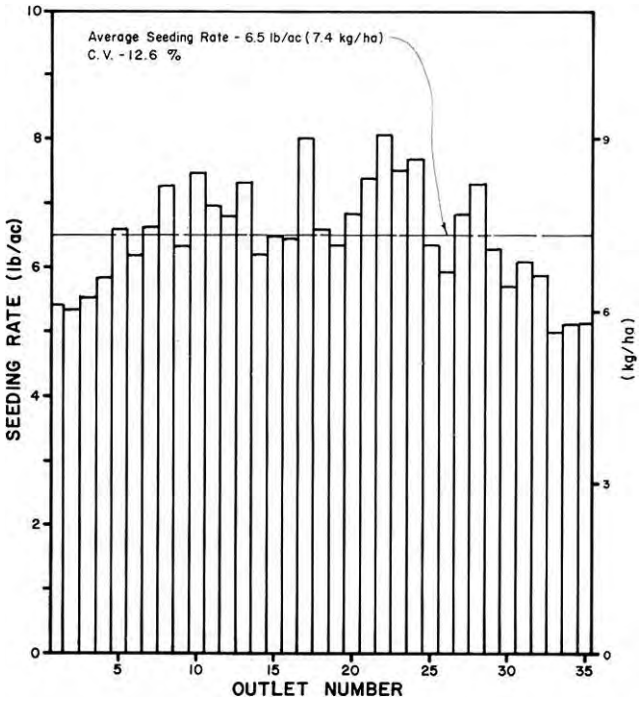

FIGURE 9. Distribution Uniformity Pattern in Canola at 6.5 lb/ac (7.4 kg/ha) at a Fan Speed of 2000 rpm.

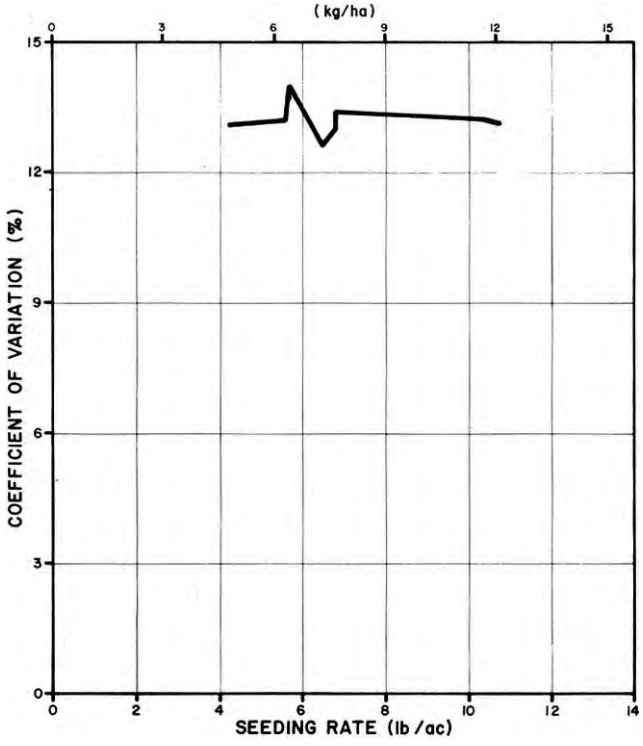

FIGURE 10. Distribution Uniformity in Canola over a Range of Seeding Rates at 5.0 mph (8 km/h) at Varying Fan Speeds.

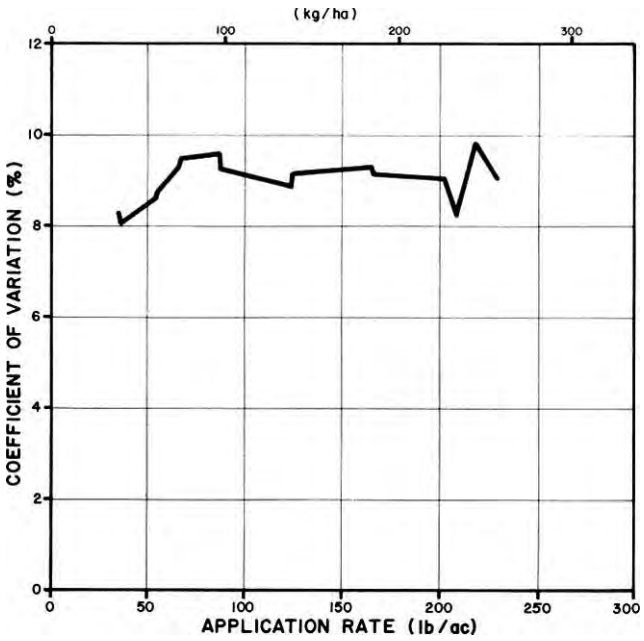

FIGURE 11. Distribution Uniformity in Fertilizer over a Range of Application Rates at 5.0 mph (8 km/h).

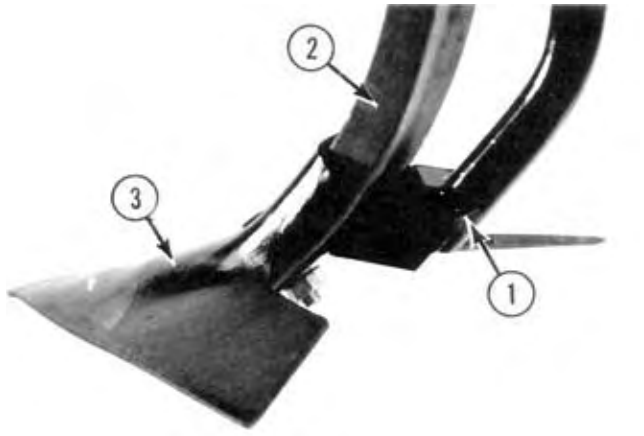

FIGURE 12. Model 1203 Banding Boot: (1) All-Purpose Boot, (2) Cultivator Shank, (3) Sweep.

EASE OF OPERATION AND ADJUSTMENT

Maintenance: Lubrication was convenient with very good access to all grease ttings. The fan bearings required greasing every 5 hours while the main idler pulley required greasing every 10 hours. Chains and wheel bearings required annual servicing. The diesel engine was conveniently located at the rear of the applicator for easy access. The recommended oil change interval for the engine was 250 hours or annually. Engine fuel consumption was about 0.5 gal/h (2.3 L/h). The engine could run about 37 hours on one lling of the 18.5 gal (84 L) tank. A service schedule was supplied in the operator's manual.

Filling/Cleaning: Ease of lling and cleaning the air seeder was good. The 6 in (152 mm) loading auger supplied was convenient for lling the tanks. To ll one tank it took approximately 15 minutes. Power for the hydraulically driven auger was supplied from the tractor hydraulic system. Hydraulic lines from the applicator to the tractor were not supplied. Auger reversal was possible by repositioning the control valve lever on the hydraulic valve. Auger plugging was not a problem throughout the evaluation.

The auger could be conveniently swung from its horizontal transport position on the adjustable auger mount that was secured to the applicator frame. The auger hopper was supplied with safety screen and could be inverted for cleanout. It is recommended that the manufacturer consider modifying the auger hopper to reduce the amount of material left in the hopper by the auger after the applicator tanks have been lled.

The large 15.8 in (401 mm) diameter grain and fertilizer tank openings gave ample room for auger lling with the hose spout provided on the auger. The ller openings were located 9.2 ft (2.8 m) above ground. The ller lids were screwed down to seal the tanks. An optional screen basket was also screwed into each ller opening.

Convenient access and cleaning of the meter box was possible with the tanks full. This was accomplished by removing the shutoff plate from the meter box and inserting it into the slot above the meter. Each meter was equipped with a cleanout door, which was located below the meter box.

Transporting: Ease of transporting the Model 1203 Chinook seeding and fertilizing system with the CI Model 807 cultivator was very good. The applicator was easily attached to the trailing hitch mounted on the cultivator. Hook-up of six hydraulic lines and two electronic couplers for the monitoring system was required. However, it was dif cult for one person to connect the primary hose to the main air line on the applicator. It is recommended that the manufacturer consider modifying the coupler assembly to allow for quick and easier connections.

Care had to be taken when disconnecting the cultivator from the tractor, because of the negative hitch weight caused by the addition of the harrows and the primary distribution stack on the cultivator. It is recommended that the manufacturer consider balancing the cultivator so that an operator can safely hitch and unhitch the unit from his tractor.

Since the applicator is towed behind, visibility of the cultivator was very good. This was considered a desirable feature. However, with the additional pivot point the applicator and cultivator combination was dif cult to manoeuvre while backing up. The Model 1203 Chinook was easily placed into transport position in less than ve minutes (FIGURE 13). Two hydraulic cylinders raised the cultivator wings to the upright position. The meter drive was conveniently engaged and disengaged electrically from the tractor. The assembly towed well in transport position. Overall transport height and width were 13.9 ft (4.2 m) and 20.3 ft (6.3 m) respectively, requiring care when travelling on public roads.

FIGURE 13. Transport Position.

Monitoring: The test machine was equipped with an electronic controller (FIGURE 14). The programmable keys included the "display select", "digit select" and "add/subtract displayed digit". These keys were used in programming the values for the "working width", "front meter rate", "rear meter rate", "fan rpm" and " ow sensor no.". The operating keys included the "power", "panel light", "unit conversion", "area reset", "front meter and rear meter" and "front meter and rear meter override". The warning lights indicated "front bin low", "rear bin low", "implement up" conditions. The indictor lights were selected by using the "display select" key. The indicator lights include "working width", "front meter rate", "rear meter rate", "fan speed", " ow sensor no.", "area", and "ground speed".

The top digit display would monitor the indicator light selected by the display select key. For example, if the amount of acres covered was desired, the operator would press the "display select" key until the indicator light opposite "area" was lit, thus displaying the value in the top digit display. The bottom digit display would only display the rear meter rate value if the rear meter was running. If the controller detected a problem with the operation of the applicator an alarm would sound and the appropriate indicator light would ash. For example, if the applicator's engine ran out of fuel the indicator light opposite the "fan rpm" would start to ash. By pushing the "display select" key until the fan speed value is displayed on the top digit display the operator would determine that there is a problem with the applicator's engine. This was a convenient feature for determining whether the meter was operating at the right speed or not.

When the area indicator light was lit the controller would display the area in either acres or hectares. The acre meter was accurate and recorded acres to the nearest tenth of an acre.

The acre meter gave a reading of about 1% high which is considered accurate. As the operator became experienced with the controller the programming and operating became quick and easy to perform. The test machine was also supplied with one ow sensor for each secondary header. Using this con guration the controller would indicate if there was material passing through the primary tubes. Additional ow sensors are available to monitor each shank.

FIGURE 14. Model 1203 Chinook Electronic Controller.

Seeding and Fertilizing Rates: Ease of setting the seeding and fertilizer rates was very good. The application rate was changed by programming a new rate setting into the “front meter rate”, or “rear meter rate” on the controller (FIGURE 14). This setting was determined from the calibration charts provided. The programmed meter rate number controlled the speed of the auger. Pressing the “front meter override” or the “rear meter override” key allowed the operator to increase the desired rate by approximately 18%. Pressing the key again would return the meter back to the original rate. The in nite adjustment of the controller was able to give precise seeding rate adjustments.

EASE OF INSTALLATION

Ease of installing the distribution and monitoring system was fair. The installation of the distribution system included mounting the secondary headers onto the cultivator, mounting the trailing hitch onto the cultivator, installing the primary distribution stack onto the trailing hitch. The 6 in (152 mm) primary hose was connected to the primary header attached to the distribution stack and to the main air supply of the applicator. The 2.5 in (63.5 mm) hose was routed from the primary header to the secondary headers. The 1.25 in (31.8 mm) hose was routed from the secondary headers to the seed boot attached to the cultivator shank. The ow sensors were inserted into the appropriate secondary hoses and the implement up switch was mounted onto the cultivator. The implement up and ow sensors wiring were connected to the ow collector box and the electrical harness was routed from the air seeder to the monitor located in the tractor cab.

In most cases when installing the distribution system it would take one person approximately 8 hours. With the Model 1203 Chinook distribution system it took two people approximately 12 hours. The increased labour was due to the dif culty of installing the primary distribution stack and hose onto the cultivator and the complexity of the monitoring system.

POWER REQUIREMENTS

The draft (drawbar pull) and corresponding tractor horsepower requirements depended on the size and type of cultivator used. Refer to PAMI reports on cultivators for estimates of draft and horsepower requirements. The operator can expect up to a 5% increase in draft due to the applicator cart. The amount of increase depends on eld preparation, soil type and moisture content, ground speed and the amount of seed and fertilizer in the tanks.

OPERATOR SAFETY

The Model 1203 Chinook access ladder and platform was convenient and safe. A safety handrail was provided at the edge of the platform. The unit was 20.3 ft (6.7 m) wide in transport position, which necessitated caution when towing on public roads, over bridges and through gates. The center frame was held in the raised position by securing the safety links on the center frame towers in the transport position. Two hydraulic cylinders raised the cultivator wings to the upright position.

A slow moving vehicle sign was provided on the rear of the applicator. The Model 1203 Chinook air seeder towed well at speeds up to 17 mph (28 km/h). With the remote fan location, the operator station noise level in most modern tractor cabs was virtually unaffected by fan noise.

OPERATOR’S MANUAL

The operator’s manual for the Model 1203 Chinook air seeder contained useful information on safety, assembly, adjustment, speci cations, maintenance and operation. A detailed parts list was also included. Calibration charts, calibrated in pounds per acre and kilograms per hectare, were included in the operator’s manual.

MECHANICAL HISTORY

TABLE 2 outlines the mechanical history of the Model 1203 Chinook air seeder during 130 hours of operation while processing about 2430 ac (984 ha). The intent of the test was evaluation of functional performance. An extended durability evaluation was not conducted.

TABLE 2. Mechanical History

ITEM	OPERATING HOURS	EQUIVALENT FIELD AREA ac	(ha)
Applicator			
-primary tube plugged and system adjusted at	1, 3, 5	16, 45, 80	(6, 18, 32)
-secondary hoses plugged and blockage removed at	1, 3, 5	16, 45, 80	(6, 18, 32)
-main fuse blew at	2, 6, 16, 36	31, 62, 256, 648	(13, 25, 104, 262)
-applicator fuse blew and replaced at	6, 36, 83	62, 648,1494	(25, 262, 605)
-bolts holding top auger flighting bearing worked loose and retightened at	8	136	(55)
-front primary support strap tore and modifications were made at	26	468	(189)
-rear primary support strap tore and modifications were made at	32	576	(233)
-modifications to metering system by manufacturer at	62, 68	1116, 1224	(452, 496)
-seed boot was damaged by rocks and repaired at	75	1350	(547)
-frame bent causing chain to come off front meter idler and repaired at	77, 95	1386, 1710	(561, 692)
-main air-line support bracket was bent at	126	2268	(918)
-latches connecting primary hose to main air-line broke at	126	2268	(918)
Manufacturer installed:			
-tank structure supports		end of test	
-new air filter structure		end of test	
-new front and rear primary support straps		end of test	
-tank isolator pad		end of test	
-new set screw on transmission pump		end of test	
-new steel auger		end of test	
Cultivator			
-replaced broken sweeps at	75, 77	1350, 1386	(547, 561)
-replaced 20 split pins at	96	1728	(700)

Manufacturer’s Modifications to the Applicator: Modi cations to the Model 1203 Chinook included the installation of tank structure supports, the installation of a new air cleaner assembly, replacement of the primary hose straps with more durable strapping, the addition of tank isolation pads between the tank and the main frame, the upgrading of the set screws on the transmission pumps, and the replacement of the polyurethane auger with a steel auger.

A polyurethane auger was supplied with the air seeder at the beginning of the test period. During testing it became evident that the polyurethane auger was binding in the auger casing thus stopping the metering of grain. Numerous methods were tried to eliminate the problem. It was decided that the polyurethane auger would be replaced with a steel auger. The metering charts presented in the report re ect this change.

DISCUSSION OF MECHANICAL PROBLEMS

Front Meter Idler: When the front meter idler sprocket was tightened, pressure exerted on the frame caused it to bend (FIGURE 15), thus causing the idler sprocket to ip the chain off of the auger sprocket. It is recommended that the manufacturer consider reinforcing the frame to which the idler sprocket is secured to ensure the sprocket is running parallel to the auger sprocket.

FIGURE 15. Idler Sprocket and Bent Frame.

Bent Seed Boots: The seed boot de ector would bend easily out of shape. The slot in the de ector would allow the soil to deform the de ector (FIGURE 16). The problem was solved by lling in the slot on the seed boot de ector.

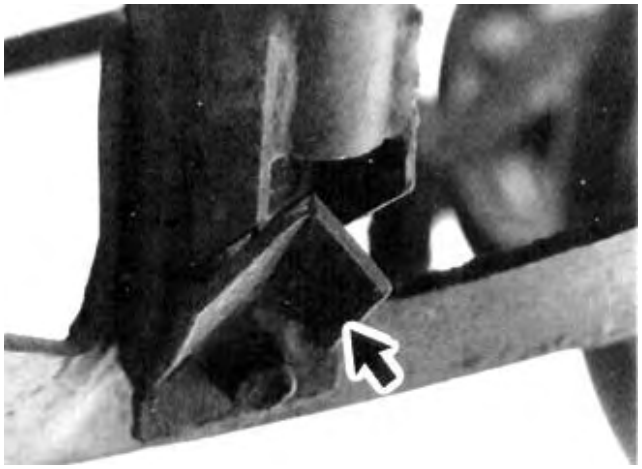

FIGURE 16. Bent Seed Boot De ector.

Interference Between Primary Hose and Front Castor Wheels: The primary hose was close enough to the front castor wheels that when the tires did a sharp turn they would come in contact with and bend the support bracket of the primary hose (FIGURE 17). It is recommended that the manufacturer consider modifying the primary hose support bracket to eliminate the interference between the support bracket and the front castor wheels.

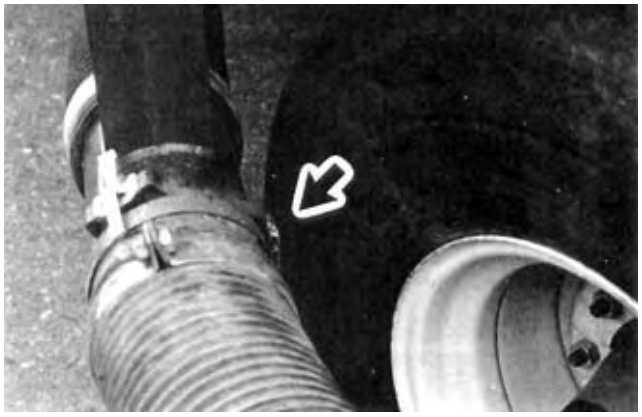

FIGURE 17. Interference Between Primary Hose and Front Castor Wheels.

APPENDIX I

SPECIFICATIONS

(A) APPLICATOR	
MAKE:	Cereal Implements
MODEL:	1203 Chinook
SERIAL NUMBER:	67005/00075
MANUFACTURER:	Vicon Western Canada P.O. Box 3200 1000 - 6 Ave. N. E. Portage la Prairie, Manitoba R1N 3R3
DIMENSIONS:	
-width	11 ft (3.4 m)
-length	21.7 ft (6.6 m)
-height 11 ft (3.4m)	
-maximum ground clearance	15 in (381 mm)
-wheel tread	9.7 ft (3.0 m)
METERING SYSTEM:	
-type	seed; double ighted steel auger fertilizer; single ighted steel auger
-number of meters	two
-drive	chain driven
-adjustment	controlled by monitor
-airstream loading	pressurized tanks
-transfer to openers	pneumatic conveyance through divider headers and plastic tubes
TANK CAPACITIES:	
-front tank	110 bu (4004 L)
-rear tank	110 bu (4004 L)
FAN:	
-type	centrifugal
-make	Northern Blowers Inc. Ser. #A3294.34
-maximum operating speed	3500 rpm
-drivebelt	driven from air cooled diesel engine
ENGINE:	
-make	Lombardini Diesel
-model	832
-serial number	5LD825-2/BI 2649197
-power rating	30.0 hp (22.5 kW) @ 2600 rpm
-starting system	12-VDC
-fuel tank capacity	18.5 gal (84 L)
WHEELS:	
-tandem	six, 16.5L-16.1 6 ply
NUMBER OF LUBRICATION POINTS:	4 grease ttings 6 wheel bearings chains, oiled annually hydrostatic pump, checked daily
(B) AUGERSIZE:	6 in (152 m)
DRIVE:	Hydraulically driven by tractor
OPTIONAL EQUIPMENT:	Distribution system for 25 to 90 outlets ow sensors, dual purpose seed boots, metal mesh tank screen

WEIGHTS: APPLICATOR:	**TANKS EMPTY**	**TANKS FULL OF WHEAT**
-hitch wheels	1190 lb (541 kg)	6320 lb (2873 kg)
-left wheels	1830 lb (832 kg)	6905 lb (3139 kg)
-right wheels	2410 lb (1096 kg)	6265 lb (2848 kg)
TOTAL	5430 lb (2470 kg)	19490 lb (8860 kg)

APPENDIX II

MACHINE RATINGS

The following rating scale is used in PAMI Evaluation Reports:

Excellent	Very Good
Good	Fair
Poor	Unsatisfactory

SUMMARY CHART

CEREAL IMPLEMENTS MODEL 1203 CHINOOK SEEDING AND FERTILIZING SYSTEM

RETAIL PRICE:	(March, 1988, f.o.b. Lethbridge, Alberta) a) $37,887.00. Chinook 1203 Seeding and Fertilizing System b) $22,528.00. CI Model 807, 35.5 ft (10.8 m) heavy duty cultivator
QUALITY OF WORK:	
Seed Placement:	**good;** band widths ranged from 3.2 to 8.2 in (81 to 157 mm)
Soil Finishing:	**very good;** seedbed
Metering Accuracy:	all grain charts were updated to coincide with the new chromed auger. **good;** measured fertilizer rates were 8 to 9% low over the entire range
Distribution Uniformity:	**very good;** wheat and barley **good:** fertilizer **fair;** canola
EASE OF OPERATION AND ADJUSTMENT:	
Maintenance:	**very good;** easily accessible
Filling/Cleaning:	**good;** auger was supplied
Transporting:	**very good;** care was required due to width of unit **very good;** visibility
Monitoring:	v**ery good**; convenient features
Seeding and Fertilizing Rates:	**very good;** could be adjusted from tractor
EASE OF INSTALLATION:	**fair;** required two people 12 hours to install
OPERATOR SAFETY:	when unhitching, caution was required due to negative hitch weight
OPERATOR'S MANUAL:	**very good;** detailed parts list also included
MECHANICAL HISTORY:	front idler sprocket frame twisted, numerous speed boot de ectors bent and support for primary hose was bent

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