A Co-operative Program Between
ALBERTA FARM MACHINERY RESEARCH CENTRE
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Research Update 702

Bourgault Air Seeder Pulse Seed Handling

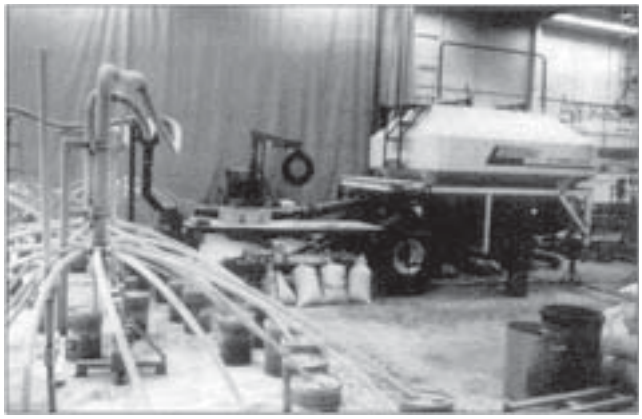
INTRODUCTION

Many farmers are using air seeders to seed pulse crops. PAMI (Prairie Agricultural Machinery Institute) and AFMRC (Alberta Farm Machinery Research Centre) have previously reported on seed damage to pulse crops as caused by individual components of air seeders (Report #668). The report indicated that air seeder components, especially when seeding lentils, have the potential of reducing seed germination. However, the results were not conclusive. There were no clear indications of the cause of damage or ways to minimize it; nor did the project provide a reliable way to determine how the respective performance of each component would combine into the performance of a complete air seeder. The report recommended that further research should be conducted to provide more conclusive results.

Bourgault Industries contracted PAMI to determine the pulse seed handling characteristics of their complete air seeder.

PROJECT PROCEDURE

The handling characteristics of two Bourgault air seeder distribution systems were determined in two pulse crops: Express peas and Laird lentils. The distribution system included the metering augers, primary and secondary manifolds, seed boots and all hoses. The first system tested was termed the “New” system, which according to Bourgault, became standard equipment on all new Bourgault Air Seeders shipped from the factory after July 1, 1993. The other system tested was termed the “Old” system. It was the system tested in Alberta Farm Machinery Research Centre (AFMRC) Report #658, published in November 1991. The air seeder used in these tests was 40 ft (12.2 m) wide set to an 8 in (200 mm) row spacing.



The Laird lentils and Express peas were at 14 percent moisture content. Seeding rates were 70 and 100 lb/ac (78 and 112 kg/ha) for the lentils, and 160 and 200 lb/ac (179 and 224 kg/ha) for peas at travel speeds of 5 mph (8 km/h). (These rates were selected in consultation with Dr. Al Slinkard of the University of Saskatchewan Crop Development Centre as two appropriate test conditions.)

The seed damage tests were conducted with the air seeder on a level surface. Sag in the delivery hoses was adjusted to the manufacturer’s recommendations. Seed was conveyed without fertilizer and the samples were collected at the seed boots in woven poly seed bags. Fan speeds were set to the manufacturer’s recommendations. At those speeds, PAMI checked to ensure that no plugging occurred by visual observation and calculations to be sure that the coefficients of variation (CV) were less than 15 percent.

An accredited seed laboratory conducted pure seed and germination analysis on the lentil and pea samples. Pure seed was defined as all seeds that were greater than half the size of a complete seed with the skin attached. The germination test consisted of planting 100 pure seeds in germination trays under standard operating procedures. Seed labs normally report germination and pure seed results separately for pulse seeds. However, for this report, a total viable seed number was calculated to express a single more representative value for the seeds that will grow. Total viable seed was the percentage of pure seed multiplied by the percentage of germination. The viability of seed used for the tests is shown in TABLE 1.

Statistical analysis was conducted on samples of seed before and after air seeding using a t-test to determine if any measured differences were statistically significant.

TABLE 1. Seed Viability

Seed	Germination %	Pure Seed %	Total Viable %
Laird Lentils	91	99	90
Express Peas	86	99	85

This project solely tested for seed damage and does not imply PAMI analysis of other factors of performance. Complete evaluation results and detailed information on the Bourgault Air Seeder are available in AFMRC Evaluation Report #658.

RESULTS AND DISCUSSION

With the “New” system in lentils (TABLE 2), measured seed damage was 0 and -2%. In peas, measured seed damage was 2 and 3%.

With the “Old” system in lentils (TABLE 3), measured seed damage was -4 and 2%. In peas, measured seed damage was -2 and 1%.

IN BRIEF... THE CONCLUSIONS

- At proper fan speed (airflow) settings, the Bourgault Air Seeder caused no significant damage when seeding Laird lentils or Express peas.
- The measured damage for both Bourgault systems in Laird lentils and Express peas never exceeded 3%, while the overall average damage of all tests was 0%. The measured values were not statistically significant.

Table 2. Results With "New" Distribution System

Crop	Seed Rate @ 5 mph (8 km/h)		Fan Speed§	Seed Damage
	lb/ac	kg/ha	rpm	%
Laird Lentils	70	78	2100	0
Laird Lentils	100	112	2200	-2*
Express Peas	160	179	2800	2
Express Peas	200	224	3150	3

§Recommended settings only for a 40 ft (12.2 m) wide air seeder on 8 in (200 mm) row spacing The manufacturer gives different settings for different machine sizes.
*The negative value of seed damage was not considered accurate. It was likely measured because the amount of damage due to the air seeder was very small relative to variation of viable seed in the sample.

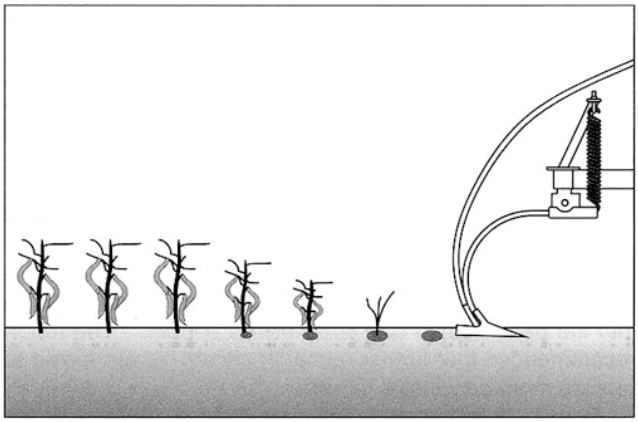
Table 3. Results With "Old" Distribution System

Crop	Seed Rate @ 5 mph (8 km/h)		Fan Speed§	Seed Damage
	lb/ac	kg/ha	rpm	%
Laird Lentils	70	78	2200	-4*
Laird Lentils	100	112	2475	2
Express Peas	160	179	2900	-2*
Express Peas	200	224	3350	1

§ Recommended cuttings only for a 40 ft (12.2 m) wide air seeder on 8 in (200 mm) row spacing. The manufacturer gives different settings for different machine sizes.
*The negative value of seed damage was not considered accurate It was likely measured because the amount of damage due to the air seeder was very small relative to variation of viable seed in the sample.

Statistical analysis conducted on each of the tests indicated that the amount of damage was not significant. Thus, the specific measured values have little relevance. The primary result of these tests is that the Bourgault Air Seeder did not cause any significant damage to pulse seeds at the manufacturer's recommended settings.

The previous pulse crop damage report on air seeder components (#668) had implied some unfounded concerns with certain components used by Bourgault, specifically metering systems that use augers and primary/secondary manifold systems. Although no specific Bourgault components were used in that test, the principles of operation were similar. However, this project on the Bourgault machine has confirmed that none of the components will cause pulse seed damage when operated at the proper fan speed settings, as recommended by the manufacturer.



General Tips for Producers Seeding Pulse Crops With Air Seeders-

- Never exceed the manufacturer's recommended airflow settings. Even minor fan speed increases could result in as much as 30% damage.
- Have germination tests conducted on your seed and adjust your seeding rates accordingly. Canada No. 1 seed may have anywhere from 80 to 100% germination.
- Do not use crackage as an indication of germination damage! PAMI research indicates that there can be serious germination drops without noticeable increases in crackage.
- If you are using an air seeder (or pneumatic seed delivery system) and are unsure of the seed damage characteristics, check them out. Run seed through your machine and send the seed off to a registered seed lab to determine germination.
- Use the same procedure if, for some reason, you ever have to run your air seeder above the manufacturer's recommended settings to determine resulting germination.

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