

YIELD RESPONSE OF CORN AND SOYBEAN TO FIELD RESIDUE AND DOWN FORCE MANAGEMENT DURING PLANTING

TRIAL OVERVIEW

- Growers have technological capabilities that allow for down force and field residue management during planting. Engaging these two operations simultaneously requires specific equipment adjustments to prevent antagonism between the two technologies.
- A trial was conducted in 2015 by the Monsanto Learning Center at Huxley, IA using air pressured row cleaning system residue management technology at six different sweeping pressures during corn and soybean planting.¹ In both crops, down force was managed using hydraulic pressure down force technology. In corn, down force was set at Static Mode (125 PSI), and Auto Mode was used in soybeans. Results showed a decrease in corn yield as sweeping pressure increased, and an increase in soybean yield with increasing sweeping pressure. Was this simply a differential crop response, or was this due to the simultaneous engagement of these two technologies to affect the crop response?

RESEARCH OBJECTIVE

- This trial was conducted to determine how residue and down force management technologies interact to affect corn and soybean yields.

Location	Soil	Previous Crop	Tillage Type	Planting Date	Harvest Date	Potential Yield/Acre	Planting Rate/Acre
Huxley, IA	Clay Loam	Soybean	Conventional	04/18/2016	10/18/2016	220	34,000
Huxley, IA	Clay Loam	Corn	Conventional	05/06/2016	10/19/2016	70	150,000

SITE NOTES:

- A total of 12 treatments were applied for each crop to evaluate the interaction of residue and down force management technologies:
 - o Four air pressured row cleaning system settings -
 1. Full Lift
 2. Zero Lift
 3. 15 PSI Down
 4. 30 PSI Down
 - o Three hydraulic pressure down force settings -
 1. Static 70 PSI Down Force
 2. Static 130 PSI Down Force
 3. Auto Mode (variable down force setting at +/- 100 PSI).
- Planting was on 30-inch row spacing with 6 rows/treatment. Corn plots were 400 feet long and soybean plots were 800 feet long.

UNDERSTANDING THE RESULTS

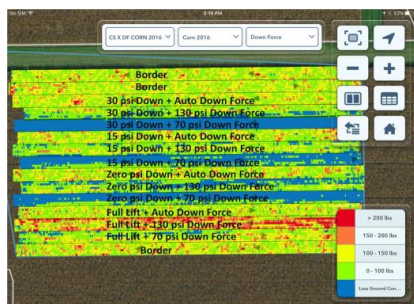


Figure 1. Field layout of corn trial investigating the interaction between residue and down force management technologies.

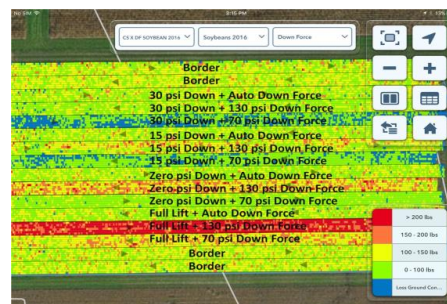


Figure 2. Field layout of soybean trial investigating the interaction between residue and down force management technologies.

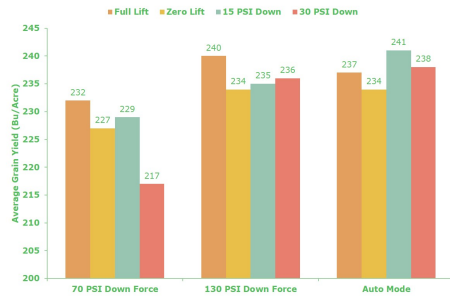


Figure 3. Corn yield response to down force and residue management.

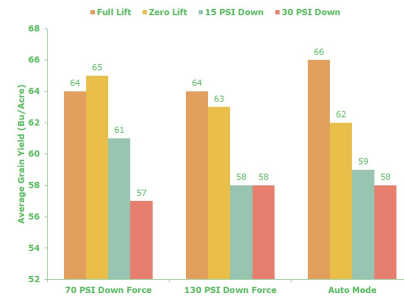


Figure 4. Soybean yield response to down force and residue management.

Treatment	Average Corn Yield (Bu/Acre)	Average Soybean Yield (Bu/Acre)
Air Pressured Row Cleaning System Settings		
Full Lift	236.4	64.9
Zero Lift	231.9	63.2
15 PSI Down	234.9	59.2
30 PSI Down	230.3	57.8
Hydraulic Pressure Down Force Settings		
70 PSI Down Force	226.3	61.7
130 PSI Down Force	236.2	60.9
Auto Mode	237.6	61.1

Table 1. Average yield response to down force and residue management in corn and soybean.

- The down force maps (Figures 1 and 2) show significant loss of ground contact in both crops when 70 PSI Down Force was applied. Loss of ground contact is shown by the intensity of blue dots on the maps. Loss of ground contact increased as sweeping pressure increased, and was much worse in corn.
- Corn and soybean response to the technologies was as follows (Figures 3 and 4):
 - With 70 PSI Down Force, Full Lift produced the highest yield in corn, whereas Zero Lift produced the highest yield in soybean.
 - With 130 PSI Down Force, Full Lift produced the highest yield in both crops. There was not much difference between the other air pressured row cleaning system settings in corn. In soybean, yield declined as sweeping pressure increased.
 - With Auto Mode, 15 PSI Down and Full Lift produced the highest yields in corn and soybean, respectively.
 - In both crops, 30 PSI Down sweeping pressure produced the lowest yields.
 - In general, at each down force setting, yield decreased as sweeping pressure increased in soybean. In corn, this trend was only observed with 70 PSI Down Force.
 - With down force management, the highest yield was produced in Auto Mode and the lowest yield in 70 PSI Down Force in both crops.
 - With residue management, 15 PSI Down Force and Full Lift produced the highest yields in corn and soybean, respectively.
- Performance of individual technologies indicated the following (Table 1).
 - Across all down force settings, yields decreased as sweeping pressure increased in both crops.
 - Down force management had minimal effects on soybean yield, but corn yield increased as down force increased.

WHAT DOES THIS MEAN FOR YOUR FARM?

- The appropriate down force setting is needed to plant seeds at a consistent depth throughout the field.
- Down force management is very important, but it is more critical in corn than in soybean.
- If the appropriate down force is not known, or in highly variable fields, Auto Mode can provide consistent down force for the field.
- When planting soybean seeds, sweeping pressure should be set at Full or Zero Lift, regardless of the down force setting.
- When planting corn, Full Lift should be used if the appropriate down force is known. Otherwise, 15-30 PSI sweeping pressure is required if Auto Mode will be used.

SOURCES

¹ Effects of field residue management on corn and soybean establishment and yield. 2015 Demonstration Report. Monsanto Learning Center at Huxley, Iowa.



LEGAL STATEMENT

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