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The four-bar air-seeder became blocked while trying to seed into the 66-cm high stubble left from the comb front and then raked.

**Stubble handling begins at harvest**

By Ed Blanchard, Agricultural Engineer, Farm Machinery Unit, Dryland Research Institute, Merredin

Long stubble left in the paddock after harvest causes major difficulties at seeding time. To demonstrate the benefits of having short stubble at seeding, the Trayning Land Conservation District Committee created four stubble treatments at harvest in 1988 and sowed into these stubble treatments in 1989.

**The harvest treatments**

The four harvest treatments were:

- A comb front leaving 66 cm (26 inches) of standing stubble which was then raked with a stubble rake
- An open front which left 30 cm (12 inches) of standing stubble
- An open front which left 15 cm (6 inches) of standing stubble
- An area where all of the stubble was burnt

The paddock was planted with Gutha wheat early in the season and the crop harvested late. The crop had shed, leaving a grain yield of only 1.4 t/ha (7 bags), and about 1.6 to 2 t/ha (8 to 10 bags) of stubble.

**The results**

Comb front leaving 66 cm (26 inches) of standing stubble which was raked

Most of the stubble in this paddock had not passed through a header and remained standing (see Photo 2). This length (66 cm) of stubble is difficult to handle because it is much more prone to block tillage equipment than short stubble.
Photo 3. The open front header left 30 cm of standing stubble.

When the crop is harvested at a height of 30 cm, more standing stubble remains at sowing than when the stubble is 66 cm high, and provides more efficient protection against wind erosion.

**Open front leaving 15 cm of standing stubble**

The stubble left by an open front harvester cutting at 15 cm high largely remained standing after it had been grazed by sheep over summer and provided efficient protection against wind erosion (see Photo 4). The sheep tended to break down the stubble which passed through the header.

When the crop was cut at this height most of the straw passed through the header and was chopped and spread by the Straw Storm®. This material is easily handled by trash clearing tillage equipment and may also be handled by more conventional equipment.

**Burnt stubble**

Seeding equipment did not become blocked during sowing because all of the stubble had been burnt (see Photo 6). However, the soil was highly prone to both wind and water erosion.

**The seeding operation**

Two types of seeders were used:

- A Horwood Bagshaw 32 row, four-bar combine with 18 cm (7 inch) tine spacing and 10 cm (4 inch) points
- A John Shearer 4150 four-bar cultivator unit used as an air-seeder with 15 cm (6 inch) tine spacing and 17.5 cm (7 inch) points.

Both seeders were pulled at a working speed of 10 km/h (6 mph).
Comb front leaving 66 cm (26 inches) of standing stubble which was raked

In the 66-cm high stubble, the combine seeder worked very poorly. Straw built up in front of the first row of tines, particularly along the header trail until these tines no longer touched the ground and the combine blocked completely (see Photo 5). The combine moved only 500 m (540 yards) before it became completely blocked.

The air-seeder worked no better than the combine in the long stubble. Straw wrapped around the front tines, and gradually built up and fell off in large clumps. These clumps were caught by the following tines as the straw passed through the machine.

At first, some clumps of straw passed through the seeder, leaving a very uneven paddock surface behind the machine. As seeding continued, the tines trapped straw more quickly and the entire machine soon became blocked (see Photo 1).

The air-seeder travelled only about 200 m (220 yards) further than the combine. Fortunately, the seeder's design allows it to lift clear of the blockage and start seeding again. Large mounds of stubble were left behind. This stubble has to be burnt and broken up with fire harrows, causing inconvenience and extra expense in both time and extra equipment.

Open front leaving 30 cm (12 inches) of standing stubble

The combine did not work well in stubble 30 cm high. Straw collected quickly against the front tines and blocked the combine by the time it had travelled 700 m (760 yards). This was about the same distance that the air-seeder had travelled in the 66-cm high stubble before it became blocked.

An open front which left 15 cm (6 inches) of standing stubble

The combine managed to travel about 800 m (870 yards) in the short 15-cm stubble before it became choked with straw.

The air-seeder passed easily through stubble this high. Straw flowed through the seeder and there were no significant blockages. The paddock surface behind the seeder was uniform, allowing more even germination.

Burnt stubble

The combine seeder and the air seeder worked efficiently in the burnt stubble. There were no problems during seeding.

Summary

In 66-cm high stubble both the John Shearer 4150 cultivator unit used as an air-seeder and Horwood Bagshaw 4 bar combine became choked with straw, making seeding inefficient and impossible.
As the stubble became shorter, the performance of both seeders improved. In short (15 cm) stubble the 4 bar combine seeder still blocked after only 800 m. The air-seeder performed well.

As would be expected, both the combine seeder and air-seeder operated well when the stubble was burnt, but there was no protection against wind or water erosion.

Overall, the best combination in this demonstration of stubble management was to use the air-seeder sowing through the stubble that had been cut at 15 cm off the ground and chopped and spread using the Straw Storm®.

This short material flowed through the air-seeder, leaving no lumps of stubble in the seedbed.