

Title Stand Establishment Responses of Maize to Seedbed Residue, Seed Drill Coulters and Primary Tillage Systems

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Abstract

Plant residues increase the risk of stand establishment for maize. This may result in reduced crop yield and may limit adoption of conservation tillage by farmers. A field study was conducted to compare the effects of two planter attachments (plain/notched coulters), two previous crop residue levels (baled/non-baled) and two tillage systems (mouldboard/chisel ploughs) on secondary surface residue, depth of seed placement, percent emergence, miss index, multiple index, quality of feed index and precision of plants spacing. Results show that the chisel plough followed by a no-coulter planter left crop residue at a quantity three times that for the mouldboard plough, a level suitable for conservation farming. The addition of a coulter assembly reduced the residue level to 30%, a level recommended as minimum for soil conservation. For the mouldboard ploughed plots, the per cent residue retained was almost half the recommended minimum residue level for soil conservation; therefore, a coulter attachment is not recommended to avoid further surface residue reduction. Residue removal resulted in a severe reduction of the surface residue on mouldboard ploughed soils to a level less than that recommended for conservation farming. In general, chisel ploughing resulted in less acceptable values both for plant establishment and indices of planter performance as compared to mouldboard ploughing. Coulter attachment improved the uniformity of plant spacing, the plain coulter performing better. The range of the precision index obtained in this study was 24.6–27.3%, indicating that the planter performance was close to the recommended range for uniform seed placement and satisfactory performance specified in the literature. The study showed that previous crop residue levels did not prove to be effective on the parameters studied. Finally, chisel ploughing followed by a coulter-planter appears to be a good alternative to a more conventional cropping system, offering advantages for conservation farming and better plant establishment; however, more precise maize sowing can be obtained on mouldboard ploughed soils.