



Mouldboard plough soil translocation variation and repeatability

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The mouldboard plough has many different configurations around the world and subsequently different soil translocation rates for different regions. In this study a mouldboard plough commonly used in the Upper Midwest (USA) over the last 40 years of the twentieth century was tested for comparison with regional results obtained by Lindstrom et al. (1992). The research site (Luverne MN) was located approximately 65 miles from the testing site used by Lindstrom et al (1992) (Lamberton MN). The slope gradient (%) range at the new site (-10 to 10 %) corresponded closely with those tested by Lindstrom et al. (1992) (-9.4 to 9.4 %). For the current study a metallic tracer excavation method was used to quantify mouldboard plough soil displacement movement in the direction of tillage. The method allowed for a high retrieval rate of soil tracer (98%) for the plot treatments. Tracers of different colors were used to provide an indication of sampling error, but did not address variability associated with operation of the tillage tool. Initial parameter measurements included tillage speed, soil moisture content, bulk density, and texture. Soil displacement measurements were adjusted for variation in plough depth using a calibration conducted at zero percent slope. Regression results from the study were comparable with that obtained by Lindstrom et al. (1992) for slope gradient vs. soil displacement regression analysis with alpha values of: $a = 34.2$ (Lindstrom et al. (1992)), $a = 33.8$ (current study) and beta values $b = 1.02$ (Lindstrom et al (1992)) and $b = 1.16$ (current study).