



Impact of grain storage into silo bags on soil penetration resistance

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Big silo sacks or bags (“silo bolsas”, in Spanish) are nowadays widely used in Argentina as an innovative technology for grain storage and conservation on the farm. Following the last harvest campaigns, 40.000.000 Tons of grains were stored in silo sacks. A standard silo sack, or silo bag, has a length of about 75 m and is 2.7 m in diameter; when laden with cereal grains, a pressure of 9.8 MPa is applied on the soil surface. Silo sacks are currently installed within agricultural fields, and, after the storage period has finished, the plot they occupied most commonly again is cultivated. The aim of this study was to assess the effect of silo sacks on soil penetration resistance (PR). Two field experiments were performed in sites located at the departments of Paraná and Nogoyá, Entre Ríos province, Argentina. The soils in both sites were classified as Vertisols and contained expansible smectite minerals, mainly montmorillonite. Soil PR was continuously recorded until 80 cm depth. The first experiment, conducted in Paraná department, involved three different treatments with five RP replicated measurements per treatment: a) a plot under a silo bag with regular machinery transit for grain uploading and downloading, and previously used as pasture for livestock, b) a plot under grassland used for mowing and without livestock transit, and c) a plot under woody native vegetation, locally called “Espinal”. The second experiment, conducted at Nogoyá department consisted of two treatments, each with for PR replications: a) a plot under silo sack with machinery transit, and b) a control plot located in the neighbouring field. In the first site a significant increase in soil PR ($P < 0.05$) under silo bag was recorded at the 0-20cm depth. In the second site soil PR was not significantly different between treatments at the 0-5 cm depth, while significant differences in PR were recorded at the 5-10 cm depth ($P < 0.05$). We concluded that soil PR measurements under silo bag provide information to assess the presence of compacted areas after the end of the storage period that might limit plant growth. The placement of a silo bag for grain storage and machinery transit significantly increased PR at this soil surface, which can restrain root growth and soil exploration by roots. In this way silo sack placement on agricultural fields should be considered as a severe threat for soil physical quality.