

Controlled Traffic Farming in Germany and Switzerland – implementation, results and recommendations

Markus Demmel¹, Hans Kirchmeier¹, Robert Brandhuber¹, Mark Marx¹, Martin Müller¹,
Martin Holpp², Thomas Anken², Hansrudolf Oberholzer², Jan Rek², Peter Weisskopf² and
Urs Zihlmann²

¹Bavarian State Research Center for Agriculture (Germany)

²Agroscope Research Station Reckenholz-Tänikon ART (Switzerland)
markus.demmel@lfl.bayern.de

Introduction

Soil compaction by field traffic during tillage, seeding, cultivation and harvesting influences soil functions negatively and often reduces crop yields. Controlled Traffic Farming (CTF) concentrates field traffic on a limited area of the field and creates a large area without soil stress by wheeling (Chamen et al. 1994). For Australian conditions Tullberg et al. 2007 have shown that CTF can increase water infiltration, decrease erosion and results in higher and more stable yields. Could these experiences be transferred to German and Swiss conditions too? Aim of the trials, started in 2008 in Switzerland and 2009 in Germany, was to adapt CTF to local farm mechanization and structures, to implement modified CTF systems on selected farms and fields, and to study CTF effects on soil structure, soil water balance and yields.

Materials and Methods

In Germany fields on three different farms were selected to establish CTF systems with 4.5 m, 5.4 m and 6 m working width according to the available mechanization. Automatic guidance systems with an accuracy of +/-2.5 cm were used. The crop rotation on Farm 1 includes small grains and sugar beet, on Farm 2 small grains and oilseed rape, and on Farm 3 winter wheat, oilseed rape and corn. In Switzerland a four-year field trial (small grains, temporary ley, corn) was installed on a loamy soil with 1200 mm annual precipitation. CTF direct drilling was compared with randomly trafficked direct-drilling and ploughing cropping systems. Extensive soil moisture measurement networks to determine soil water content were installed in the tracked and in the un-wheeled areas in three depths. Soil physical properties and yields were also separately determined in the tracked and in the un-wheeled areas.

Results and Conclusions

Due to climatic conditions and road regulations the implementation of CTF on Western European farms requires compromises regarding track and tyre widths. Trafficked areas are larger, the un-trafficked areas varied between 58% and 67%. Tracks are grown with crops too, and all machines have to be equipped with "low ground pressure tires" or rubber belt undercarriages. Soil parameters were shown to differ into un-wheeled and tracked areas, but differences were fairly slight. Yield did not react as clear as soil parameters, so no general agronomic trends could be deduced yet. However, intensive spraying-and-spreading traffic on tramlines produced clearly negative soil physical and agronomic effects. It would therefore be appropriate to use permanent tramlines in particular for spraying, spreading and transport operations. As changes in soil structure need a longer period to develop, the German investigations with an intensive soil and yield monitoring program will be continued for three more years.

