

**Improving cereal forage production and minimizing soil erosion by combining dairy manure application treatments and no till practices  
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**This research** concentrate on defining sustainable agronomic practices for wheat grown in Mediterranean environments in terms of forage productivity and soil quality. The hilly site in Ramot Menashe (32.602N 35.0512E), Israel served as a long term site for testing the effects of reduced tillage and supplementary manure on soil fertility and on wheat crop long term forage productivity. The site (Rendzina, 5% slope, annual rainfall average of 530 mm) is characterised by moderate slope and was exposed to an extreme erosion rate of ~4 mm/y during the last 60 years ending with a shallow and Stoney soil profile (5-15 cm). The agricultural runoff and pollution leaks into Menashe stream, part of the Taninim watershed. This unique location and set up provide a realistic platform to study field-environment dynamic. A long term full factorial conservation management is applied on site with two level of tillage (tillage vs no tillage) and two levels of OM supplementation (with and without single supplementation of 50 m<sup>3</sup>/hectare of treated manure). In the last 6 years regular crop rotation were kept (Clover/vetch-wheat-wheat-oat- Clover/vetch- wheat) and complete data was generated on the crop and soil levels. **Our project** focused on testing the effect of reduced tillage on soil quality and soil tolerance to erosion and runoff water. Minimum tillage are defined as “No-tillage” or in case of manure application- single cultivation step (e.g., disk harrow). Erosion and run off water were monitored at the base of a plot with special sampling equipment that will enable correlating rainstorm intensity with rates of runoff and soil erosion. Utilizing non-destructive multispectral and hyperspectral sensors (handheld and UAV) enable us to characterize Leaf Area Index (LAI) and calculate the narrowband Red Edge Position Index (REPI), as well as NDVI / NDRE indices. We have tested eight different chemical and organic manure application types as mean for basic fertilization and soil OM enhancement. That includes liquid manure (1% of organic matter). The field assays complete to phases of three years (six all together) comparing responses of the forage crop and the effect on soil erosion DM biomass was monitored at harvest to estimate potential yields of the cereal\legume crop.

In brief, analysing of 6-year data highlights the contribution of manure application with the impact on forage yield highly dependent in % organic matter in the type of manure treatment. Semi treated manure treatments were more effective and had longer impact on both soil and crop productivity compare to compost (the control). No effect of the different manure treatments on weeds population were observed in the experimental plots. We recommend application cycle of once 3 years. The exception is the liquid manure treatment which had in general a positive effect on yield (compare to no-fertilization) but require application each year (full tillage).