



## RESEARCH PAPER

## OPEN ACCESS

## Residual effects of different tillage systems, bioslurry and poultry manure on soil properties and subsequent wheat productivity under humid subtropical conditions of Pakistan

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**Key words:** Residual effects, Bioslurry, Poultry manure, Wheat productivity, Nitrogen source, Tillage practices, Humid subtropical climate.

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### Abstract

The residual effects of bioslurry and composted poultry manure on soil properties and subsequent crop productivity have not yet been studied in detail under humid subtropical conditions of Pakistan. Therefore, field studies were conducted at Gujjar Seed and Nursery Farm, Haripur, Pakistan, during 2012-2013 to determine the residual effects of different nitrogen (N) sources and tillage systems on soil properties and subsequent wheat crop in a randomized-complete-block-design with split-plot arrangement and four replicates. The tillage systems (minimum, conventional and deep) were distributed in main plots, while N sources (bioslurry, poultry manure and chemical fertilizer) with three percentages of recommended N application rates (100, 50 and 25%) that were applied to previous maize crops, were distributed in sub-plots. The results showed that N treatments significantly ( $p < 0.05$ ) affected soil properties (total soil N, available soil phosphorus (P), potassium (K) and soil organic matter (SOM) contents), wheat productivity (plant height, spike length, 1000-grain weight, grain yield and biological yield), and plant N, P and K concentrations in plant shoots at crop harvest. By contrast, tillage systems had a non-significant ( $p > 0.05$ ) effect on all the parameters except SOM contents. The interactive effect of tillage systems and N treatments were significant ( $p < 0.05$ ) on 1000-grain weight, soil total N, soil available P, K, and SOM contents at wheat harvest. It is concluded that application of bioslurry and composted poultry manure has residual effects on the next crop and has potential to increase yield of subsequent crop by reducing the cost of chemical fertilizer.

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# Residual Effects Of Different Tillage Systems Bioslurry

**F Rizvi**



## **Residual Effects Of Different Tillage Systems Bioslurry:**

*Recarbonizing global soils – A technical manual of recommended sustainable soil management* Food and Agriculture Organization of the United Nations, Intergovernmental Technical Panel on Soils, 2021-09-08 During the last decades soil organic carbon SOC attracted the attention of a much wider array of specialists beyond agriculture and soil science as it was proven to be one of the most crucial components of the earth's climate system which has a great potential to be managed by humans Soils as a carbon pool are one of the key factors in several Sustainable Development Goals in particular Goal 15 Protect restore and promote sustainable use of terrestrial ecosystems sustainably manage forests combat desertification and halt and reverse land degradation and halt biodiversity loss with the SOC stock being explicitly cited in Indicator 15.3.1 This technical manual is the first attempt to gather in a standardized format the existing data on the impacts of the main soil management practices on SOC content in a wide array of environments including the advantages drawbacks and constraints This manual presents different sustainable soil management SSM practices at different scales and in different contexts supported by case studies that have been shown with quantitative data to have a positive effect on SOC stocks and successful experiences of SOC sequestration in practical field applications Volume 3 includes a total of 49 practices that have a direct impact on SOC sequestration and maintenance in cropland grassland integrated systems and farming approaches

Innovations in Climate Resilient Agriculture Rajni Rajan, Faheem Ahmad, Kuldeep Pandey, 2025-07-16 This book discusses how modern technology interacts with agriculture soil and plants for the production of robust crops and emphasises aspects of climate change susceptibility adaptation and amelioration for agricultural sustainability Examples of such technologies that could have a significant impact on all facets of sustainably increasing agricultural productivity include genome editing gene mapping nanotechnology hydroponics IoT artificial intelligence and UAVs The book also presents the importance of computer modelling using artificial intelligence robotics and other cutting edge methods in the development of climate smart crops for long term food security improvement in vulnerable agricultural systems impacted by climate change The primary audience for the book is professional scientists as well as advanced undergraduates and graduate students It is also intended for the agricultural productivity sector including nanotechnologists plant biotechnologists horticulturists physiologists and agronomists breeders entomologists plant pathologists food policy analysts and agricultural data scientists **Handbook of**

**Energy Management in Agriculture** Amitava Rakshit, Asim Biswas, Deepranjan Sarkar, Vijay Singh Meena, Rahul Datta, 2023-05-15 This handbook provides a holistic overview of different aspects of energy management in agriculture with an orientation to address the sustainable development goals It covers possible applications not only from a technical point of view but also from economic financial social regulatory and political viewpoints Agriculture is one of the most imperative sectors that contribute to the economy across different agro ecologies of the universe with energy inputs in each stage of production from making and applying chemicals to fueling tractors that lay seeds and harvest crops to electricity for animal

housing facilities The majority of agricultural research has focused on the use of input production and productivity whereas rational energy budgeting and use remain an overlooked and likely underestimated segment ignored so far while formulating agro ecosystem framework Energy management study is a new frontier of agriculture and is challenging due to complex enterprises spatial temporal variability exposure to pollution and the predominant effect of the anthropogenic factor on ecology and environment But it is worth taking the challenge considering the important prerequisite role of energy for sustainable development which has been evidenced from increasing research in recent times Of recent origin there are critical in depth studies around the globe assessing the capture and flow of energy in the ecosystem which will help to develop a conceptual framework to incorporate this vital resource in the agriculture management template This book is a state of the art resource for a broad group of readers including a diversity of stakeholders and professionals in universities public energy institutions farmers and farming industry public health and other relevant institutions and the broader public as well

RAMIRAN 2023: Managing Organic Resources in a Changing Environment Rachel E. Thorman, David Robert Chadwick, Tom Misselbrook, Fiona Nicholson, Harald Menzi, 2025-08-12 This Research Topic of Frontiers Waste Management in Agroecosystems will highlight original contributions to the 18th International RAMIRAN conference held in Cambridge UK in September 2023 The conference will focus on developing strategies to maximise the efficiency of organic materials against a background of changing regulation policy and market forces and increasing pressure on the environment soil quality and food production Submissions are invited for papers which address one or more of the conference themes policy and regulation nutrient utilisation soil quality air and water quality treatment and processing technologies and promoting best practice

**Innovations in Ground Water and Soil Cleanup** Committee on Innovative Remediation Technologies, Commission on Geosciences, Environment and Resources, Division on Earth and Life Studies, National Research Council, 1997-11-04 Most books on ground water and soil cleanup address only the technologies themselves not why new technologies are or are not developed Innovations in Ground Water and Soil Cleanup takes a holistic approach to the entire field addressing both the sluggish commercial development of ground water and soil cleanup technologies and the attributes of specific technologies It warns that despite cleanup expenditures of nearly 10 billion a year the technologies remain rudimentary This engaging book focuses on the failure of regulatory policy to link cleanup with the financial interests of the company responsible for the contamination The committee explores why the market for remediation technology is uniquely lacking in economic drivers and why demand for innovation has been so much weaker than predicted The volume explores how to evaluate the performance of cleanup technologies from the points of view of the public regulators cleanup entrepreneurs and other stakeholders The committee discusses approaches to standardizing performance testing so that choosing a technology for a given site can be more timely and less contentious Following up on Alternatives for Ground Water Cleanup NRC 1994 this sequel presents the state of the art in the cleanup of various types of ground water and soil

contaminants Strategies for making valid cost comparisons also are reviewed **EPA Publications Bibliography**  
**Quarterly Abstract Bulletin** United States. Environmental Protection Agency,1992-10 Pollution Abstracts ,1996  
Indexes material from conference proceedings and hard to find documents in addition to journal articles Over 1 000 journals  
are indexed and literature published from 1981 to the present is covered Topics in pollution and its management are  
extensively covered from the standpoints of atmosphere emissions mathematical models effects on people and animals and  
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wastewater treatment waste management land pollution toxicology and health noise and radiation **More people, more**  
**food, worse water?** Mateo-Sagasta, Javier,Zadeh, S. M.,Turrall, H. ,2018-08-02 **EPA Publications Bibliography**  
,1992-10 **EPA Publications Bibliography** United States. Environmental Protection Agency,1992 Bibliography of  
Agriculture with Subject Index ,2000 *Effects Conservation Tillage On Ground Water Quality* Terry J Logan,2018-01-18  
Nowadays the environmental sustainability of the cropping systems is increasingly requested by the consumers Conventional  
tillage practices totally turning over the soil between the vineyard rows may cause erosion due to rain as well as structure  
destruction of the soil in the long term Conservation tillage is a soil management technique poorly widespread in Sardinia  
allowing cover cropping between vineyard rows Furthermore this technique makes the canopy development control of  
herbage possible by cutting it up during specific phenological phases Conservation tillage usually involves direct benefits to  
farmers such as increasing soil fertility as well as reduction of tillage costs soil erosion and carbon dioxide CO<sub>2</sub> emissions in  
the atmosphere This long term trial during at least five years aims to assess the conservation tillage impact on chemical  
physical soil characteristics in comparison with traditional tillage by evaluating the change of organic matter C E C and  
availability of major plant nutrients in the soil and to estimate their probable rise The field plots are located in a 35% slope  
condition vineyard showing massive erosion problem and organic matter low content A split plot design with four replications  
was set up with the comparison between conservation and traditional tillage apart as main plots Moreover the effects of two  
different irrigation levels were evaluated in the subplots of each main plot At the beginning of the trial 2011 a pedological  
survey was made Three soil profiles were described and sampled along the field slope and soil sampling in each plot were  
made both to characterize the soil and to find the zero point The soil chemical and physical characteristics were monitored  
through a second soil sampling made at the end of 2013 Conservation tillage caused increasing organic matter content and C  
E C values As for major plant nutrients in soil results were more uncertain Grapevine yield and quality parameters did not  
show any negative effect when passing from conventional to conservation tillage techniques The trial provided a preliminary  
positive evaluation of conservation tillage However more years are required to confirm this trend *Effects of Reduced*  
*Tillage on (cash) Crop Yields, Soil Quality and Other Ecosystem Services* Martine Trip,Derk van Balen,Kris Huizinga,Wiepie  
Haagsma,Timo Sprangers,Marie Wesselink,2023 Decreasing soil quality worsened by climate change related weather

extremes is prompting the Dutch Ministry of Agriculture's aim for sustainable management of all agricultural soils by 2030. One proposed practice for this goal is reduced tillage which offers potential benefits such as improved soil structure and reduced greenhouse gas emissions. However, reduced tillage comes with potential drawbacks such as topsoil compaction and yield reduction. While global meta-analyses mainly focus on effects of reduced tillage in North and South American cash crops like grains, maize and soy, this long-term Dutch farming systems experiment called BASIS is unique in its focus on Dutch small-seeded root and tuber crops. The BASIS experiment, established in 2009 by Wageningen University and Research in Lelystad, consists of three organic and two conventional fields with common Dutch crop rotations. In BASIS, we experiment with three tillage systems: conventional tillage with mouldboard plough (CT), reduced tillage with subsoiling (RTS), and reduced tillage without subsoiling (RT). Reduced tillage with shallow ploughing was added (RT SPL) later in the experiment. The experiment employs controlled traffic farming (CTF) and is a randomized complete block design with four replicates per tillage system and field. In the BASIS experiment, a system approach is used; this allowed for the experiment to be optimized during the project period. Effects of reduced tillage on ecosystem services such as yield, yield quality, and soil quality were investigated. Overall, reduced tillage systems showed comparable or higher marketable yield for most crops, except for fine-seeded crops like carrots and onions. The Twinrotor tiller seems a viable option in reduced tillage systems to create a finer seedbed and reduce the yield gap of carrots between reduced and conventional tillage. The influence of extreme weather conditions on reduced tillage effects varied with yields, sometimes higher and sometimes lower compared to conventional tillage. Over time, the differences in marketable yield between reduced and conventional tillage showed no increasing or decreasing trend. For yield quality, the difference between gross yield and marketable product was not significant, nor were there discernible trends between the tillage systems with the expedition of carrots, which showed a lower yield quality under reduced tillage with larger sized and deformed carrots. This was likely caused by cover crop residue and soil aggregate size. The impact of reduced soil tillage on crop quality parameters such as sugar content (sugar beet) and thousand grain weight (cereal crops) showed no significant differences between the tillage systems. Bulk density showed no differences in the upper 0–10 cm layer but significantly higher values were observed in the deeper 10–20 cm layer for reduced tillage. Soil moisture was generally higher for reduced tillage in the upper 0–10 cm layer while conventional tillage exhibited higher moisture in the lower 10–20 cm layer. Penetration resistance was consistently greater for reduced tillage, particularly in the 10–30 cm layer. Despite these soil property differences, there was no substantial evidence of decreased yields or root limitations. The increased compaction under reduced tillage could potentially enhance soil bearing capacity. Reduced tillage leads to higher soil organic matter and carbon content in the upper 0–15 cm layer compared to conventional tillage. However, in lower layers, no significant differences were found. Reduced tillage shows minimal impact on soil pH. Total nitrogen content is higher in the upper 0–15 cm layer for reduced tillage. Other nutrient availabilities are not strongly influenced by tillage systems. Mineral nitrogen levels in the soil

are very low in this experiment and differences between tillage systems are small Overall reduced tillage increases soil organic matter carbon and nitrogen in the upper layer 0 15 cm with a trend towards higher values in the 0 30 cm layer To summarize the BASIS experiment shows that reduced tillage is a viable option for most of the Dutch crops and indicates a trend towards improved soil quality

**Effects of Tillage System, Crop Residue Level, and Fertilizer Application Technique on Losses of Phosphorus and Pesticides from Agricultural Lands** ,1987 **Effects of Different Tillage Treatments on Labile Soil Organic Matter Pools and Stabilization Processes** Rouven Andruschkewitsch,2013

*Long-term Tillage System Effects Under Moist Cool Conditions in Switzerland* ,2004 *Effect of Tillage Systems on Soil Organic Matter Stocks and C and N Fluxes in Cereal Cropping Systems on a Silt Loam Soil in Northern France* Katrien Oorts,2006 **The Effects of Different Tillage Treatments on Crop Yields and Soil Physical Properties** J. G. Kemp,S. J. Bourget,1962 *Tillage Systems and Agricultural Management* R. R. Allmaras,1998 **Residual Herbicides for Reduced Tillage Systems and Crop Production** ,1986

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web an inherited tendency of an organism to behave in a certain way usually in reaction to its environment and for the purpose of fulfilling a specific need the development and

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