（2）2019 级资源利用与植物保护专业硕士研究生李若尘

2019 级资源利用与植物保护专业硕士研究生李若尘，依托金正大生态工程集团股份有限公司养分资源高效开发与综合利用国家重点实验室和山东农业大学金正大教学科研实践基地，在山东农大校内导师张民教授、刘之广教授和校外实践导师、泰山产业领军人才陈宏坤研究员的联合指导下完成了“冬小麦专用控释掺混肥农学效益及其增产增效机制”成果。

通过长期定位研究明确了公司产品冬小麦专用控释掺混肥料一次性施肥，提高小麦灌浆期土壤氮素养分供应强度的调控途径和微生物学机制，阐明小麦根系形态、养分吸收效率对养分缓释响应的生理生化机理，为公司产品推广提供了理论依据和数据支撑。现推广 15.75 万亩，企业新增销售收入 1701 万元，经济社会效益显著。

读研期间成果：“Blended controlled-release nitrogen fertilizer with straw returning improved soil nitrogen availability, soil microbial community, and root morphology of wheat”已在国外学术期刊 Soil & Tillage Research（5-year IF: 7.8）发表。

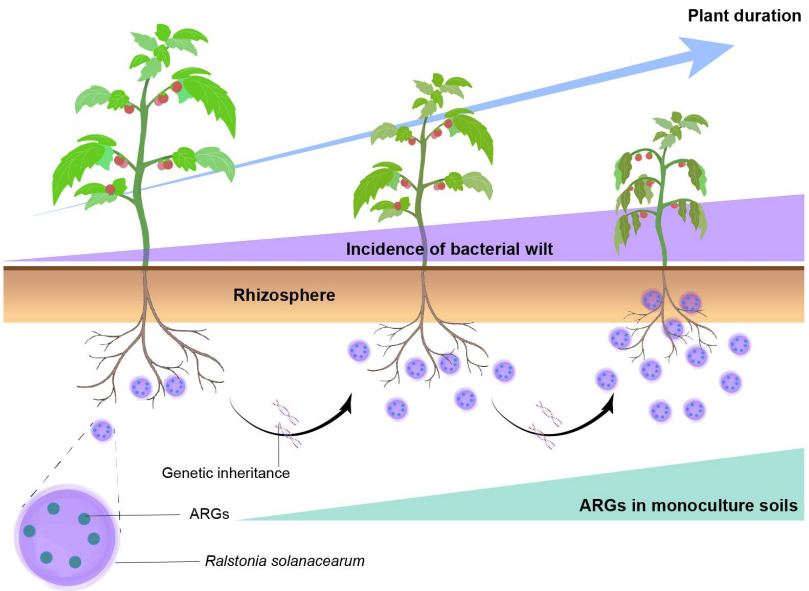
大型仪器(GS-MS）学习（山东泰安）

实践导师指导田间数据采集（山东泰安）

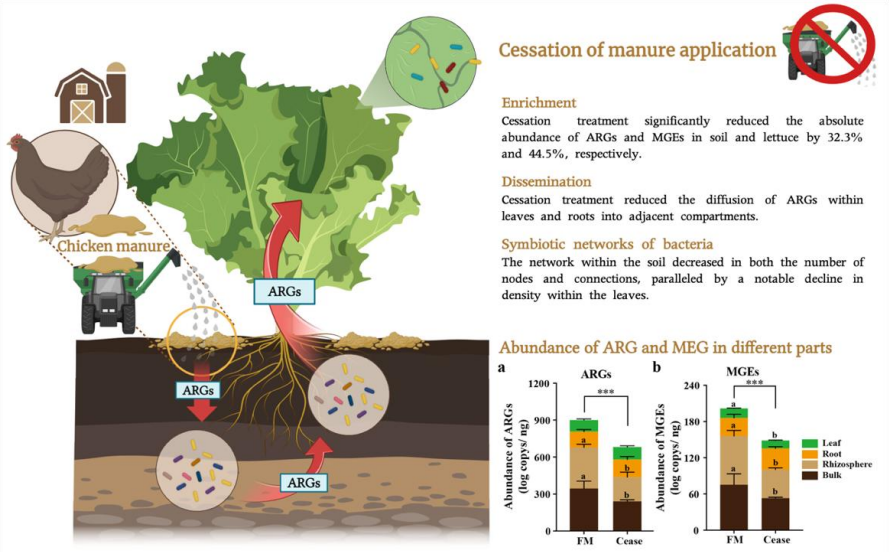
硕士毕业后，李若尘通过申请考核制，考取了南京农业大学资源与环境科学学院农业资源与环境专业博士研究生，加入沈其荣院士团队李荣教授课题组开展学习与研究。博士阶段的研究主要围绕不同施肥及环境条件下土壤微生物群落、抗生素抗性基因（ARGs）以及土传病害的动态变化展开。通过长期田间和温室试验，系统地揭示了有机/生物有机肥料以及粪肥停施、物理化学处理等管理措施对土壤微生物网络、ARGs 传播及作物病害抑制的影响，尤其关注番茄青枯病的发生与土壤抗性之间的关系。博士期间以第一作者发表 SCI 论文 3 篇，毕业后拟去往江苏省农业科学院工作。

成果简介：

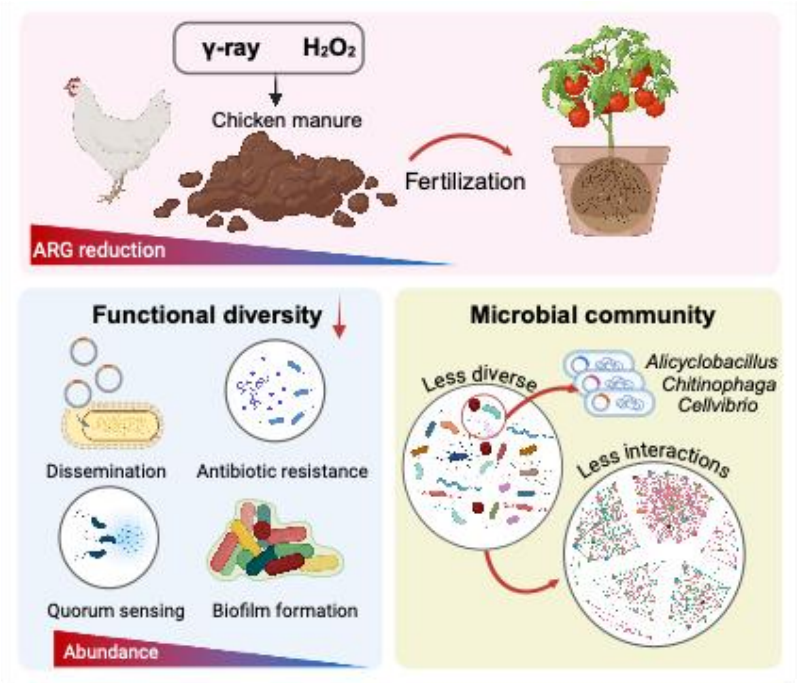
1. Environment International (2024)：首次揭示了番茄细菌性青枯病暴发与土壤抗生素抗性增强的伴随关系，阐明了土传病害动态与 ARGs 扩散之间的联系。



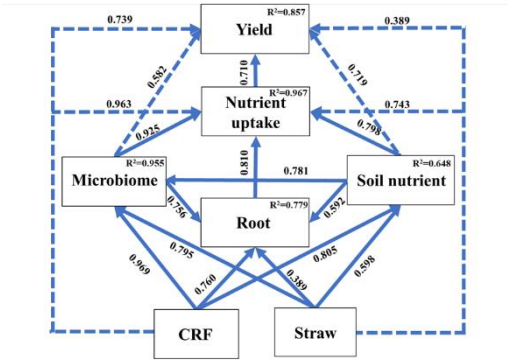
2. Applied Soil Ecology (2025)：发现粪肥停施可通过重塑土壤–生菜系统的细菌互作模式显著降低 ARGs 传播潜力，为可持续施肥策略提供科学依据。

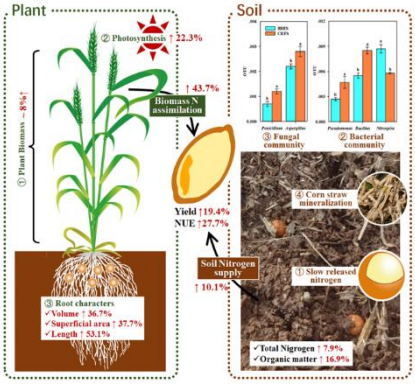


3. Ecotoxicology and Environmental Safety：探讨了γ射线与过氧化氢协同处理在阻断粪肥向土壤传递 ARGs 过程中的作用，提出了农业土壤 ARGs 风险防控的新途径。



硕士期间成果及实践佐证：





Soil & Tillage Research 212 (2021) 105045

Contents lists available at ScienceDirect

Soil & Tillage Research

journal homepage: www.elsevier.com/locate/still

Blended controlled-release nitrogen fertilizer with straw returning improved soil nitrogen availability, soil microbial community, and root morphology of wheat

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ARTICLE INFO

Keywords:
Controlled-release fertilizer
Straw returning
In-situ root scanner
RNA high throughput sequencing

ABSTRACT

Microbial activities and nitrogen (N) availability in soil directly affect root morphology and consequently crop yield. These relationships are even more critical at the filling stage of wheat due to the grain formation. The objective of this study was to compare effects of blended controlled release N fertilizer (CRFS) and conventional urea (BBFS) on soil microflora, soil N content, and root growth of wheat at the filling stage in a field with straw return for seven years. The method of 16 s rRNA and ITS high-throughput sequencing was used to probe soil microbial status, and the in-situ root scanner was used for in-situ observation and monitoring of wheat root morphology during two growing seasons. The results showed that CRFS increased the relative abundance of *Penicillium* and *Aspergillus* fungal genera and reduced the operational taxonomic unit of nitrifying bacteria of the genus *Nitrospira* compared to BBFS treatment. Nitrate, ammonium, total N, and organic matter in soils treated CRFS were 15.8 %, 10 %, 7.5 %, and 11.6 % higher than those in soils treated with BBFS, respectively, while the total root length, root surface area, and root volume from CRFS treatment were 57.6%, 68.8 %, and 54.1 % higher than these from BBFS, respectively. Above ground growth of wheat showed that CRFS increased plant height by 5.8–12.6 %, net photosynthetic rate by 13.5–22.2 %, N content of stems and spikes by 10.0 % and 64.1 %, respectively compared to BBFS. Wheat yield and economic efficiency were increased by 9.9–46.8 %, 11.6–41.7 %, respectively with CRFS treatments than these with BBFS treatments. Wheat received reduced application rate (2/3) of CRFS had similar availability of N and plant growth as the full rate of BBFS. Therefore, using blended controlled-release N fertilizer is a practically and environmentally feasible approach for wheat production in the straw returning wheat-corn rotation system.

1. Introduction

Wheat (*Triticum aestivum L.*) is one of the world's top three food crops, accounting for 26 % of global food production (Ruisgi et al., 2019). It is important for food security to maintain yield and protect environment by optimizing fertilizer practice. The filling stage of wheat is the critical period for grain formation and transition from vegetative growth to reproductive growth. An adequate supply of nitrogen (N) during that growing stage retarded leaf senescence, maintained a high photosynthetic rate, and provided carbohydrates for grain filling, thereby increased crop yields (Li et al., 2012). The final accumulation of N in the grain was partly due to retranslocation of N from nutrient organs during filling stage and partly due to N uptake from the soil (Kong et al., 2016). Nitrogen levels in wheat nutrient organs and soil nutrient availability were important factors in determining wheat grain yield, the N accumulation and protein content in the grain (Zhang et al., 2012). Therefore, for increasing wheat yield, one needed to focus on nutrient availability and crop growth during critical periods of wheat growth.

For the traditional corn-wheat farming system in the North China Plain, corn stalks were usually burned before planting the following

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https://doi.org/10.1016/j.still.2021.105045
Received 27 December 2020; Received in revised form 15 March 2021; Accepted 19 March 2021
Available online 14 May 2021
0167-1987/

所在单位实践评价

（主要包括研究生实践期间的出勤情况、完成工作内容、工作能力、沟通能力、工作主动性等方面的评价。可另附页）

李若尘同学在我单位进行实践期间，表现良好，纪律性强，严格要求自己，工作较为主动，及时汇报反馈，未出现迟到早退等现象，严格遵守单位各项规章制度，纪律严明，遵守劳动纪律和操作规程。

在实践期间业务能力不断提高，实习计划详细、规范，并根据实际情况与实习单位共同修订完善，明确实习任务与实习目的。吃苦耐劳，踏实认真，基础知识扎实，在实践中应用提升，善于总结经验，依照实习大纲要求，结合实际内容完成实习任务，可独立解决问题切实达到了实践学习的目的。能深入实际，积极探讨本专业未来发展前景，认真完成实习报告 ，记载实习收获。在工作中服从工作安排、认真负责，观察力较强，思维敏捷，能完整的完成科研任务。

在本次实践中，李若尘同学做到了学以致用，理论联系实际，主动设计了切实可行的试验方案，独立思考能力较强，擅长发现问题，解决问题，且在后续研究中取得了优秀的成绩。在实践期间，发表了两篇文章以及专利一项，工作能力突出，日常与同事，上级交流，可以明确的表达自己的想法与需求，沟通高效。李若尘同学吃苦耐劳，与农民一起在田间生产作业，任劳任怨能吃苦，人际交往能力强，通过本次实践，协调能力，反应能力，学习和接受能力，团队协作意识等综合素质都有不同程度的提升。

负责人签字：　　（单位（公章））　2021年3月5日

校外导师评语

李若尘同学在本试验基地实践期间，业务能力不断提高，吃苦耐劳，踏实认真，基础知识扎实，在实践中应用提升，善于总结经验，可独立解决问题切实达到了实践学习的目的。在工作中服从工作安排、认真负责，观察力较强，思维敏捷，能完整的完成科研任务。总体来说，李若尘在本次实践中表现优秀！

导师签名：　　2021年3月5日

校内导师评语

李若尘同学品行端正，团结同学，有强烈的集体意识，团队协作能力突出。思维缜密，一如既往地保持正确的态度认真对待学业，有明确的规划和目标，在一年的实践中，研究成果较丰富。

导师签名：　　2021年3月8日

学院审核意见（对研究生是否完成实践环节给出审核意见）

同意

学院分管负责人签名：　　学院章　2021年3月9日

研究生处审核意见

同意

负责人签字：　　研究生处公章　年　月　日