

## 《中国农业发展战略研究》专题快报

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### 【动态资讯】

#### 1. Feeding 10 billion people by 2050 within planetary limits may be achievable

**【EurekAlert!】** A global shift towards healthy and more plant-based diets, halving food loss and waste, and improving farming practices and technologies are required to feed 10 billion people sustainably by 2050, a new study finds. Adopting these options reduces the risk of crossing global environmental limits related to climate change, the use of agricultural land, the extraction of freshwater resources, and the pollution of ecosystems through over application of fertilizers, according to the researchers. The study, published in the journal Nature, is the first to quantify how food production and consumption affects the planetary boundaries that describe a safe operating space for humanity beyond which Earth's vital systems could become unstable. "No single solution is enough to avoid crossing planetary boundaries. But when the solutions are implemented together, our research indicates that it may be possible to feed the growing population sustainably," says Dr Marco Springmann of the Oxford Martin Programme on the Future of Food and the Nuffield Department of Population Health at the University of Oxford, who led the study.

链接:

[https://www.eurekalert.org/pub\\_releases/2018-10/src-f1b100518.php](https://www.eurekalert.org/pub_releases/2018-10/src-f1b100518.php)

#### 2. Flexible fertilizer regulations could reduce pollution, save billions

**【EurekAlert!】**PRINCETON, N.J.--As the global population continues to increase, so will food production. This means increased use of fertilizers, and many on today's market are not environmentally friendly. To reduce pollution and save billions of dollars in damages, the United States and other national governments should require manufacturers to sell nitrogen

fertilizer with compounds designed to increase their efficiency and reduce pollution, according to a new paper published in Nature Sustainability. Such a policy could substantially reduce air and water pollution from nitrogen use, including greenhouse gases. The researchers estimate that using this approach among U.S. corn farms could reduce nitrogen pollution by 16 percent, earn farmers millions of dollars through higher crop yields, and reduce total costs of nitrogen pollution up to \$5 to \$7 billion.

链接:

[https://www.eurekalert.org/pub\\_releases/2018-10/puww-ffr101218.php](https://www.eurekalert.org/pub_releases/2018-10/puww-ffr101218.php)

### **3. Climate changes require better adaptation to drought**

**【Aarhus University】** Europe's future climate will be characterized by more frequent heat waves and more widespread drought. Heat and drought will both challenge crop production, but drought in particular will be a problem -- especially for spring sown crops such as maize. Maize is a crop that will find things more and more difficult as climate change gives us more drought during the summer. After the summer of 2018, we can get a sense of how the future summer climate of Europe might be: lots of heat and serious drought - and crops that wither and die. The risk of experiencing a summer such as the one we have just been through will increase in the years to come due to climate change. Therefore, agriculture must find crops and cultivation methods better suited to the new conditions. This will require knowledge about the drivers of, in particular, yield under climate change. A European team of scientists, which included researchers from the Department of Agroecology, Aarhus University, have addressed this issue, and they have recently published the results of their studies in Nature Communications. The research team, which was led by Leibniz Centre for Agricultural Landscape Research, investigated whether heat or drought poses the greatest threat to maize and winter wheat in Europe. The researchers based the analysis on insights of plant physiology to show - for the first time ever on a large scale - what exactly causes yield losses at elevated temperatures.

链接:

<http://agro.au.dk/en/current-news/news/show/artikel/climate-changes-require-better-adaptation-to-drought/>

### **4. New policy brief highlights role of indigenous peoples in maintaining global food security**

**【EurekAlert!】** ROME, ITALY (16 October 2018)-- A new policy brief released today--World

Food Day--highlights the link between recognizing community land rights and ensuring global food security and climate protection. The brief notes that the failure of governments around the world to recognize community land rights leaves community lands vulnerable to expropriation for large-scale agriculture, mining, or infrastructure, which typically benefit fewer people and are more environmentally destructive than land use by local communities. "Communities around the world rely on their customary lands to feed their families. But their lands also feed the world, and their forests regulate the climate that underpins global food security. However the global food system is deeply linked to land grabs, and agribusiness is the most dangerous sector for activists" said Joan Carling, Advisory Board member of Land Rights Now, a global campaign to raise awareness of the contributions of Indigenous Peoples and local communities to myriad global challenges, and recent winner of the Champions of the Earth Award for lifetime achievement, the UN's highest environmental distinction.

链接:

[https://www.eurekalert.org/pub\\_releases/2018-10/rari-npb101618.php](https://www.eurekalert.org/pub_releases/2018-10/rari-npb101618.php)

## 5. The science of sustainability

**【 EurekaAlert! 】** The U.S. city of Louisville, Kentucky isn't known as a hotbed of environmental action and innovation, but that could change as it has recently become home to a first-of-its-kind collaboration between environmentalists, city leaders and public health professionals. The Green Heart Project, funded in part by the United States National Institutes of Health, will plant trees in neighborhoods throughout the city and monitor how they affect residents' health. It's a boundary-pushing medical trial--a controlled study of nature as a medical intervention. Green Heart is just one project in one city, but it represents a new way of thinking about the role of conservation in solving human problems. It is part of an emerging model for cross-sector collaboration that aims to create a world ready for the sustainability challenges ahead. Is this world possible? Here, we present a new science-based view that says "Yes"--but it will require new forms of collaboration across traditionally disconnected sectors, and on a near unprecedented scale. Many assume that economic interests and environmental interests are in conflict. But new research makes the case that this perception of development vs. conservation is not just unnecessary but actively counterproductive to both ends. Achieving a sustainable future will be dependent on our ability to secure both thriving human communities and abundant and healthy natural

ecosystems.

链接:

[https://www.eurekalert.org/pub\\_releases/2018-10/uoca-tso101618.php](https://www.eurekalert.org/pub_releases/2018-10/uoca-tso101618.php)

## 6. 微生物—纳米技术恢复盐碱地活力

【中国农业新闻网】9月23日,恰逢首届中国农民丰收节,在位于松嫩平原的吉林省白城市镇赉县五家子灌区建平区片的试验田里,镇赉县农业技术推广中心组织专家正在取样,对种植的水稻进行测产。在这里,两块水稻试验田均使用了“微生物—纳米整合技术”,一年期施用改良剂的地块平均亩产461.3公斤,两年期施用改良剂的地块平均亩产498.3公斤。中国工程院院士、吉林农业大学原校长李玉赞叹道:“我50年前曾经在白城市工作过,对这里非常熟悉。我今天看到原来的风沙、盐碱、干旱地区能够有如此面积的水田,当年产量还能达到400~500公斤,我觉得这项技术很值得推广。”“微生物—纳米整合技术”是由北京中农熙丰生态科技有限公司(以下简称中农熙丰)联合多位国内外专家学者,研制出的具有自主知识产权的治理盐碱地新技术。吉林大学教授张世宏告诉记者,该技术遵循土壤成土原理,从盐碱地形成机理、土壤结构和生态环境等角度入手,通过优选的天然准纳米非金属矿物介质,使盐碱地耕作层自发地进行水土分离、自然沉降,并最后在犁底层形成惰性盐碱隔离界面;同时,在土壤中施用嗜盐抗碱型微生物菌剂,利用其在耕作层中排酸中和、胞体内富集盐分惰性化处理,及分泌胞外酶降解有机物等多种分子机制,降低土壤盐碱度,激活土壤微生物活性,改善土壤团粒结构,并结合培肥土壤,达到根治盐碱地的目的。

链接:

[http://www.farmer.com.cn/jjpd/nz/fl/201809/t20180928\\_1407350.htm](http://www.farmer.com.cn/jjpd/nz/fl/201809/t20180928_1407350.htm)

## 7. “亲土1号”助力灾后土壤修复

【中国农业新闻网】“你看我这个棚,在水里泡了差不多得有10天,晾干后土壤明显发白,这就是板结和盐渍化的表现,需要抓紧增施菌肥和有机肥改良土壤。”近日,山东省寿光市营里镇西黑冢子后村农民宋光军告诉记者。不久前,宋光军刚刚建好12个大棚,就遭遇了洪灾,不仅前期建棚的投入打了水漂,还有两个棚体直接垮塌,多个大棚严重受损,光是抢修和恢复生产,就让宋光军花光了之前所有的积蓄。为了尽快恢复生产,他在水位降下去以后,补栽了一批菜苗,但眼下,土壤板结情况严重,菜苗长势孱弱,如何筹资买肥料、买什么样的肥料,都成了摆在他面前的难题。关键时刻,寿光市政府把金正集团捐助的土壤改良产品——“亲土1号”,送到了宋光军手中。“这是一种新型土壤改良肥料,周边有些农户在用,我去看了,土壤通透性明显好很多,植物根系也发达,产量增幅在2~3成,效果特别

好。”宋光军高兴地说。中国农业大学教授高丽红介绍说,土壤修复是灾后恢复生产的首要任务。“大棚经过大水长期浸泡,土壤中的有益菌和病原菌都被杀死了,这个时候,菜农可以抓住机会,通过合理施用有机肥和菌肥等,利用有益菌重建土壤生态系统,为产业升级奠定基础。”她说,浸泡时间较短的土壤,很容易出现板结、盐渍化等问题,也需要合理施用有机肥,提高土壤有机质含量。

**链接:**

[http://www.farmer.com.cn/jjpd/nz/fl/201809/t20180928\\_1407352.htm](http://www.farmer.com.cn/jjpd/nz/fl/201809/t20180928_1407352.htm)

## 8. 河南：新技术为土壤减肥让农民增效

【中国农业新闻网】9月26日,豫东周口市西华县天朗气清,黄泛区农场的农民王和武一大早就来到了自家流转的玉米地里看玉米长势。“今年施用了‘微蜜’有机水溶肥料,每亩玉米不仅少施了20%的化肥,玉米的长势还明显旺盛了,现在看这玉米籽粒长得多饱满,丰收已成定局,以后真不能小瞧这种高科技肥料。”种60多亩玉米的王和武随手剥开了一个玉米棒的外皮后兴奋地说。王和武所种的一部分玉米田被河南奈安公司定为玉米试验田,以此来展示其生产的“微蜜”有机水溶肥土壤减肥增效技术的效果。当天,还有来自河南农业大学、河南省农业科学院、河南省农业技术推广总站,以及全省40多个县市农业土肥系统的专家前来王和武的玉米地里参观考察试验田内的玉米长势情况。金秋九月,豫东平原上随处可见丰收的景象,王和武的玉米也已经成熟等待收获。在玉米田内,王和武与周口农业部门的一名工作人员一起从玉米试验田以及相邻地块连根拔起两棵玉米,只见试验田的玉米根系更发达、更粗壮。“这是因为施用了‘微蜜’有机水溶肥料,改善了土壤,增加了肥力,从而改善了作物的生育性状和长势。”现场一位农业专家解释。为进一步验证“微蜜”有机水溶肥新技术对土壤减肥、作物增效的效果,河南省农业厅组织有关专家对施用该肥料的百亩玉米示范田进行现场测产验收。测产验收报告显示,玉米品种为登海605,根据测产方案,专家组随机分别抽取6个点进行测产,试验田结果为亩产量686.5kg,较示范区周边相同品种的常规种植田块平均亩产610.1kg,增产76.4kg/亩,增产率达12.5%。

**链接:**

[http://www.farmer.com.cn/jjpd/nz/fl/201810/t20181010\\_1408954.htm](http://www.farmer.com.cn/jjpd/nz/fl/201810/t20181010_1408954.htm)

## 9. 邹城东傅村：流转土地种出“金”

【中华人民共和国农业农村部】以每亩千元的价格流转外村土地承包经营权,建设现代化草莓、葡萄大棚,再出租给村民和农户,亩产值达到6万元以上,实现了土地效益的增值和集体收入的增加。山东省邹城市中心店镇东傅村的“流转经”,让每亩土地的产值

有了飞跃式增长。谈起“流转经”，东傅村党支部书记程学良细说从头：东傅村位于邹城岗山北麓，全村土地2730亩，一半是缺水的山岭地。村民们从上世纪90年代就开始种植苹果、桃等经济作物，但当时受技术、基础设施等制约，种植瓜果的效益不理想。为摆脱靠天吃饭的窘境，提高群众收益，2007年程学良带着当时的村委会班子先后到江苏、河南等地学习，确定了发展草莓大棚的思路。党员干部带头，群众热情高，村里又成立了合作社引导群众抱团发展，东傅村就发展草莓大棚800多个，成为山东省最大的草莓生产专业村。村里注册的商标“富东草莓”被认证为有机农产品，叫响了草莓产业品牌。尝到了种植草莓等经济作物“甜头”的村民，开始纷纷调整种植结构，80%以上的农户都建起现代化生产大棚，渐渐地无“地”可用的局面成为了制约群众扩大种植规模和发展大棚经济的最大瓶颈，不少村民找到村干部和合作社“诉苦”。东傅村成为邹城市开展农村土地承包经营权流转激活农村资源的一个缩影。据了解，作为山东省确定的全国农村集体产权制度改革试点县市之一，仅去年以来，邹城市已完成土地承包经营权流转交易922笔、流转面积12.16万亩，有力促进了农业规模化经营和现代化发展，为乡村振兴打下坚实的产业基础。

**链接:**

[http://www.moa.gov.cn/xw/qg/201810/t20181015\\_6160780.htm](http://www.moa.gov.cn/xw/qg/201810/t20181015_6160780.htm)

## 10. 吉林省各地积极宣传“令行禁止” 严格管控秸秆露天焚烧

【中华人民共和国农业农村部】又是一年秋收时。为有效防范秸秆露天焚烧影响环境空气质量，给交通运行、消防安全带来的隐患，今年，全省各地早部署、早行动，多渠道、全方位宣传秸秆焚烧的危害性，全力做好群众的思想教育工作，力争做到“令行禁止”。在前郭县乌兰傲都乡的农田里，各种机械开始收获作业。收割后的田野里，乌兰傲都乡各村的秸秆禁烧巡逻队也开始了巡逻值守。在田间地头昼夜巡逻的同时，巡逻队还承担着对农民进行秸秆禁烧有关法律法规的宣传工作。前郭县乌兰傲都乡派出所民警贾超凡介绍说，要将焚烧秸秆的后果清楚的传达给老百姓，让百姓真正意识到严重性，焚烧秸秆才“堵”得住。今年，前郭县为确保秸秆禁烧工作取得实效，因地制宜制定秸秆禁烧工作方案，组建机动巡查组在全县分片开展巡查。同时，组织开展秸秆禁烧区划定方案的编制工作，确保秸秆禁烧工作更趋合理化和科学化，制定秸秆离田机制，提高秸秆资源利用水平。前郭县乌兰傲都乡红卫村村民贾宝林说：“以前焚烧秸秆也不知道违法行为、有污染，现在知道是违法行为以后，坚决不能干这种事了。”

**链接:**

[http://www.moa.gov.cn/xw/qg/201810/t20181015\\_6160733.htm](http://www.moa.gov.cn/xw/qg/201810/t20181015_6160733.htm)

## 【研究报告】

### 1. Science Breakthroughs to Advance Food and Agricultural Research by 2030

发布源: The National Academies of Sciences, Engineering, and Medicine

发布时间: 2018-01-01

摘要: Over the course of its study, the committee held discussions with members of the scientific community to identify the most challenging issues facing food and agriculture and the best research opportunities to address them. In the next decade, the major goals for food and agricultural research include: (1) improving the efficiency of food and agricultural systems, (2) increasing the sustainability of agriculture, and (3) increasing the resiliency of agricultural systems to adapt to rapid changes and extreme conditions. These goals derive from the common nature of key research challenges identified by food and agricultural scientists, which include the following: increasing nutrient use efficiency in crop production systems; reducing soil loss and degradation; mobilizing genetic diversity for crop improvement; optimizing water use in agriculture; improving food animal genetics; developing precision livestock production systems; early and rapid detection and prevention of plant and animal diseases; early and rapid detection of foodborne pathogens; and reducing food loss and waste throughout the supply chain.

链接:

<http://agri.ckcest.cn/ass/a0c0e29b-bc43-43da-b4e3-9aa4d157709a.pdf>

## 【文献速递】

### 1. 中国与东盟农产品贸易的虚拟水流动特征分析

作者: 韦苏捷; 王素仙

文献源: 世界农业,2018

摘要: 本文采用2006—2016年中国与东盟农产品贸易数据, 测算并分析了中国与东盟农产品贸易中的虚拟水流动及其特征。研究表明, 中国与东盟农产品贸易总体表现出虚拟水净进口状况, 中国农产品虚拟水的净进口量在-121.8157亿~722.0710亿 m<sup>3</sup>, 且中国的净进口量一直处于上升态势; 中国与东盟农产品贸易虚拟水流动频繁的国家主要是越南、泰国、新加坡和缅甸; 中国虚拟水出口主要是蔬菜类(大蒜和干豆)和水果类(苹果和柑橘类水果)农产品, 进口则主要是谷物类(大米)和水果类(香蕉和芒果)农产品。

链接:

<http://agri.ckcest.cn/ass/38340f60-5d62-4705-a08d-6cf023c46a54.pdf>

## **2. Research Methods of Water Resources Carrying Capacity: Progress and Prospects**

作者: LI Yi; YANG Yanzhao; YAN Huimin, et al.

文献源: Journal of Resources and Ecology,2018

摘要: The study of water resources carrying capacity (WRCC), a major component of resources and environment carrying capacity (RECC), began relatively recently. However, WRCC has witnessed a rapid development in terms of concept, calculation methods, and empirical research in recent years. WRCC has become an important criterion for rational development and utilization of regional water resources. This paper first briefly reviews the development process of WRCC. It then evaluates and contrasts the representative research methods of conventional trend (CT), system dynamics (SD), multi-objective model analysis (MOMA), comprehensive evaluation (CE), and dynamic simulation recursive (DSR). The results show that although there are various methods of WRCC, the major methods used have become out-of-date and stagnant, and new more sophisticated methods and technologies are lacking. Specifically, our analysis found that the index system, scientific robustness and comprehensiveness of evaluation criteria of current research methods are insufficient and need to be improved. In addition, the dynamic research of WRCC should receive more attention, and it requires further study to make it more applicable to real-world uses. Finally, a set of monitoring and early warning systems should be established and applied in demonstration areas to meet the urgent needs of water resource management in the new era.

链接:

<http://agri.ckcest.cn/ass/67c8c189-203f-418e-9bbd-49756eb464e3.pdf>

## **3. 国内外资源环境承载力及区域生态文明评价:研究综述与展望**

作者: 余茹, 成金华

文献源: 资源与产业,2018

摘要: 生态文明是人类经济社会发展到一定阶段的必然要求,是实现可持续发展的前提。资源环境承载力是生态评价的重要依据,科学探究区域生态承载力有利于提高生态文明评价的准确性。近年来在新发展理念推动下,各地高度重视生态文明建设,但区域性生态文明建设需要有力的综合评价,生态文明评价成为指引生态建设的重要手段。在融合资源环境承载力、生态文明评价,并与区域经济社会发展相结合的资源生态研究将成为富有生命力的研究方向。

链接:

<http://agri.ckcest.cn/ass/e3404dcd-1bf0-4828-9fff-9cb17bbebc0a.pdf>

#### **4. Data Descriptor: Gridded emissions and land-use data for 2005–2100 under diverse socioeconomic and climate mitigation scenarios**

作者: Shinichiro Fujimori<sup>1</sup>; Tomoko Hasegawa; Akihiko Ito, et al.

文献源: Scientific Data,2018

摘要: Information on global future gridded emissions and land-use scenarios is critical for many climate and global environmental modelling studies. Here, we generated such data using an integrated assessment model (IAM) and have made the data publicly available. Although the Coupled Model Inter-comparison Project Phase 6 (CMIP6) offers similar data, our dataset has two advantages. First, the data cover a full range and combinations of socioeconomic and climate mitigation levels, which are considered as a range of plausible futures in the climate research community. Second, we provide this dataset based on a single integrated assessment modelling framework that enables a focus on purely socioeconomic factors or climate mitigation levels, which is unavailable in CMIP6 data, since it incorporates the outcomes of each IAM scenario. We compared our data with existing gridded data to identify the characteristics of the dataset and found both agreements and disagreements. This dataset can contribute to global environmental modelling efforts, in particular for researchers who want to investigate socioeconomic and climate factors independently.

链接:

<http://agri.ckcest.cn/ass/593b7c12-aefd-4f01-930c-ba0a58923231.pdf>

#### **5. Groundwater nitrate response to sustainable nitrogen management**

作者: Birgitte Hansen; Lærke Thorling; Jörg Schullehner, et al.

文献源: Scientific Reports,2018

摘要: Throughout the world, nitrogen (N) losses from intensive agricultural production may end up as undesirably high concentrations of nitrate in groundwater with a long-term impact on groundwater quality. This has human and environmental health consequences, due to the use of groundwater as a drinking water resource, and causes eutrophication of groundwater-dependent ecosystems such as wetlands, rivers and near-coastal areas. At national scale, the measured nitrate concentrations and trends in Danish oxic groundwater in the last 70 years correlate well with the annual agricultural N surpluses. We also show that the N use efficiency of agriculture is related to the groundwater nitrate concentrations. We demonstrate an inverted U-shape of annual nitrate concentrations as a function of

economic growth from 1948 to 2014. Our analyses evidence a clear trend of a reversal at the beginning of the 1980s towards a more sustainable agricultural N management. This appears to be primarily driven by societal demand for groundwater protection linked to economic prosperity and an increased environmental awareness. However, the environmental and human health thresholds are still exceeded in many locations. Groundwater protection is of fundamental global importance, and this calls for further development of environmentally and economically sustainable N management in agriculture worldwide.

链接:

<http://agri.ckcest.cn/ass/3c011ac6-3a0a-474a-b52e-e6f3f2ff6455.pdf>

## **6. Developing China's Ecological Redline Policy using ecosystem services assessments for land use planning**

作者: Yang Bai; Christina P. Wong; Bo Jiang, et al.

文献源: Nature Communications,2018

摘要: Ecosystems services (ES) assessment is a significant scientific topic recognized for its potential to address sustainability issues. However, there is an absence of science policy frameworks in land use planning that lead to the ES science being used in policy. China's Ecological Redline Policy (ERP) is one of the first national policies utilizing multiple ES, but there is no standardized approach for working across the science policy interface. We propose a transdisciplinary framework to determine ecological redline areas (ERAs) in Shanghai using: ES, biodiversity and ecologically fragile hotspots, landscape structure, and stakeholder opinions. We determine the five criteria to identify ERAs for Shanghai using multi-temporal, high resolution images (0.5 m) and biophysical models. We examine ERP effectiveness by comparing land use scenarios for 2040. Compared to alternative land uses, ES increase significantly under the ERP. The inclusion of ES in spatial planning led stakeholders to increase terrestrial habitat protection by 174% in Shanghai. Our analysis suggests that strategic planning for ES could reduce tradeoffs between environmental quality and development.

链接:

<http://agri.ckcest.cn/ass/960a66e8-c489-4009-88ca-bc248ec39620.pdf>

## **7. The environmental costs and benefits of high yield farming**

作者: Andrew Balmford; Tatsuya Amano; Harriet Bartlett, et al.

文献源: Nature Sustainability,2018

摘要: How we manage farming and food systems to meet rising demand is pivotal to the future of biodiversity. Extensive field data suggest that impacts on wild populations would be greatly reduced through boosting yields on existing farmland so as to spare remaining natural habitats. High-yield farming raises other concerns because expressed per unit area it can generate high levels of externalities such as greenhouse gas emissions and nutrient losses. However, such metrics underestimate the overall impacts of lower-yield systems. Here we develop a framework that instead compares externality and land costs per unit production. We apply this framework to diverse data sets that describe the externalities of four major farm sectors and reveal that, rather than involving trade-offs, the externality and land costs of alternative production systems can covary positively: per unit production, land-efficient systems often produce lower externalities. For greenhouse gas emissions, these associations become more strongly positive once forgone sequestration is included. Our conclusions are limited: remarkably few studies report externalities alongside yields; many important externalities and farming systems are inadequately measured; and realizing the environmental benefits of high-yield systems typically requires additional measures to limit farmland expansion. Nevertheless, our results suggest that trade-offs among key cost metrics are not as ubiquitous as sometimes perceived.

链接:

<http://agri.ckcest.cn/ass/47ee304f-a6ef-4fdc-a9c6-a275caf62c5c.pdf>

## **8. A global meta-analysis of yield stability in organic and conservation agriculture**

作者: Samuel Knapp; Marcel G.A. van der Heijden

文献源: Nature Communications,2018

摘要: One of the primary challenges of our time is to enhance global food production and security. Most assessments in agricultural systems focus on plant yield. Yet, these analyses neglect temporal yield stability, or the variability and reliability of production across years. Here we perform a meta-analysis to assess temporal yield stability of three major cropping systems: organic agriculture and conservation agriculture (no-tillage) vs. conventional agriculture, comparing 193 studies based on 2896 comparisons. Organic agriculture has, per unit yield, a significantly lower temporal stability (-15%) compared to conventional

agriculture. Thus, although organic farming promotes biodiversity and is generally more environmentally friendly, future efforts should focus on reducing its yield variability. Our analysis further indicates that the use of green manure and enhanced fertilisation can reduce the yield stability gap between organic and conventional agriculture. The temporal stability (-3%) of no-tillage does not differ significantly from those of conventional tillage indicating that a transition to no-tillage does not affect yield stability

链接:

<http://agri.ckcest.cn/ass/56e2f8f8-3a08-43f3-b061-cca4c1f5e719.pdf>

## **9. A technology-forcing approach to reduce nitrogen pollution**

作者: David R. Kanter; Timothy D. Searchinger

文献源: Nature Sustainability,2018

摘要: Nitrogen pollution has exceeded safe levels outlined in the planetary boundaries literature. As agricultural production continues to intensify, pollution abatement will require acute increases in nitrogen-use efficiency. Policies that rely on the voluntary adoption of farm-level management practices have rarely led to significant reductions in nitrogen pollution and are unlikely to achieve the required efficiency improvements. Enhanced-efficiency fertilizers offer a promising opportunity, but have modest adoption rates and receive limited research support. Here we propose a policy to increase farmer adoption modelled on the Corporate Average Fuel Economy standards used to increase the fuel efficiency of vehicles in the United States. This programme would require the fertilizer industry to increase the proportion of enhanced-efficiency fertilizers in traditional fertilizer over time, providing incentives for companies to improve both their products and their understanding of where their products are most effective. Using the US corn sector as a case study, we estimate that such a policy could generate net economic benefits of US\$58 billion by 2030.

链接:

<http://agri.ckcest.cn/ass/c72d2076-b71c-4f10-a7bb-f4b20ff20eaf.pdf>

## **10. Human augmentation of ecosystems: objectives for food production and science by 2045**

作者: Masatoshi Funabashi

文献源: Science of Food,2018

摘要: Current food production systems require fundamental reformation in the face of

population growth, climate change, and degradation of health and the environment. Over the course of human history, every agricultural system that has emerged has featured some sort of trade-off between productivity and environmental load. These trade-offs are causing the planet to exceed the boundaries of its biogeochemical cycles and are triggering an unprecedented extinction rate of wild species, thus pushing global ecosystems to the brink of collapse. In this era, characterized as it is by human activity that can profoundly influence climate and the environment (i.e., the Anthropocene epoch), tipping points can be either negative or positive. While a negative tipping point can produce sudden, rapid, and irreversible deterioration of social and environmental systems, a positive tipping point can produce improved health and sustainable social-ecological systems. The key to promoting positive global tipping points is a thorough understanding of human activity and life history on an evolutionary scale, along with the comprehensive integration of science and technology to produce intelligent policies and practices of food production, particularly in the developing world (See Supplementary Material 1 summary for policymakers). Simply increasing the efficiency and scale of monoculture-intensive agriculture is unlikely to drive social-ecological change in a positive and sustainable direction. A new solution to the health-diet environment trilemma must be developed to achieve a net positive impact on biodiversity through the anthropogenic augmentation of ecosystems based on the ecological foundation of genetic, metabolic, and ecosystem health. This paper discusses the fundamental requirements for sustainable food production on the molecular, physiological, and ecological scales, including evolutionary and geological insights, in an attempt to identify the global conditions needed for the primary food production to ensure we survive this century. Particular emphasis is placed on how to make extensive use of this planet's genetic resources without irretrievably losing them.

链接:

<http://agri.ckcest.cn/ass/2d42c965-c3de-408c-8b0a-573c81c73110.pdf>

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