

《智慧农业发展战略研究》专题快报

2021年第23期（总第38期）

中国工程科技知识中心农业分中心

中国农业科学院农业信息研究所

2021年12月4日

【动态资讯】

1. “小秸秆”撬动“大产业”，赞！

【农民日报】近日有媒体报道，山东省临沂市郯城县农民把收获的水稻、玉米等秸秆，晾晒消毒后编织成精美的秸秆工艺品销往国内外，目前出口秸秆工艺品100多万件(套)，消化农作物秸秆4000多万公斤。这样既避免了秸秆焚烧造成环境污染，又增加了农民收入。换一种思路，秸秆回收的“老大难”也能变成增收致富的新亮点。事实上，通过肥料化、饲料化、燃料化、基料化和原料化利用，“小秸秆”不仅可以撬动“大产业”，还对提升耕地质量、改善农业农村环境、实现农业高质量发展和绿色发展意义匪浅。开展秸秆综合利用，需因势利导、因地制宜，强化政府引导、市场运作与科技支撑。要以完善利用制度、出台扶持政策、强化保障措施为推进手段，激发秸秆还田、离田、加工利用等环节市场主体活力，建立健全政府、企业与农民三方共赢的利益联结机制，推动形成布局合理、多元利用的产业化发展格局。

链接:

<http://agri.ckcest.cn/file1/M00/0F/EB/Csgk0GGrJ9uAHbwyADtJhxP8o3g642.pdf>

2. 重温“给农业插上科技的翅膀”重要论述努力实现高水平科技自立自强

【中国农科院】11月27日，在习近平总书记视察山东省农科院并提出“给农业插上科技的翅膀”重要论述八周年之际，中国农业科学院、农业农村部科技发展和山东省农业科学院共同组织召开第二届“给农业插上科技的翅膀”理论研讨会。农业农村部党组成员、中国农科院院长吴孔明，党组书记张合成，副院长梅旭荣，农业农村部科技教育司司长周云龙出席会议。

链接:

<http://agri.ckcest.cn/file1/M00/0F/EB/Csgk0GGrKlaAIXScAAheNc-6df0861.pdf>

3. 科学家找到抗枯萎病关键中心基因油桐枯萎病难题有望解决

【农民日报】枯萎病是植物十大真菌病害之一。截至目前，已有百余种植物栽培种相继被发现发生此病。生产最好的植物干性油之一的油桐也深受其害，全国六成以上的油桐林不同程度暴发此病。不过今后，这个病有望得到有效控制，原因是中国林科院亚热带林业研究所的特色资源育种与培育团队找到了抗枯萎病的关键中心基因。日前，这一研究成果正式公布，引起业界高度关注。据了解，油桐枯萎病又叫“桐瘟”，三年桐很是易感，但同属的千年桐发病率却极低，不过很可惜，后者的生长结实慢、桐油品质也较次。过去为了降低“桐瘟”发病率，最有效的办法就是以千年桐为砧木，再嫁接三年桐。而此次，研究人员就是以千年桐为材料，探寻抗枯萎病的基因和机制。通过电镜观察，研究人员发现，油桐枯萎病病原菌可穿透三年桐侧根的皮层，横向侵染韧皮部和木质部，再通过侧根木质部纵向扩展到主根和茎的木质部。但在千年桐中，病原菌只能传播到侧根的韧皮部，无法侵染到侧根木质部，从而阻断向地上部分的传播。由此比较三年桐和千年桐侵染过程的转录组，关键的抗病中心基因找到了。经过研究也表明，在千年桐根的木质部，该基因确实可通过抑制负调控因子的表达，从而发挥抗枯萎病作用。

链接:

<http://agri.ckcest.cn/file1/M00/0F/EB/Csgk0GGrKRSAMt1JACg9S7jWQg8880.pdf>

4. 小菌菇开出“智慧云”

【农民日报】贵州省农业科学院、国家食用菌产业技术体系黔东南综合试验站站长张邦喜博士在位于贵阳市白云区食用菌产业示范园区内的高山百益食用菌发展公司给工人们指导食用菌装袋制作菌棒等生产技术。初冬时节，寒风四起，但贵州省贵阳市白云区食用菌种植大棚里的繁忙景象却温暖了寒意。近年来，白云区依托区位、资源、气候优势，按照“一园多点”产业布局，不断健全完善食用菌全产业链，让食用菌产业更好地与现代技术相结合，小菌菇搭上了物联网发展的快车，打造“智慧菌云”，从菌棒生产、食用菌培育、食用菌加工、认证检测、履历追溯等方面全链条跟踪、全方位管理食用菌产业，按下了现代都市农业的快进键，有力助推乡村振兴。

链接:

<http://agri.ckcest.cn/file1/M00/03/19/Csgk0WGrKN6AT6giACg9S7jWQg8947.pdf>

5. “互联网+”农产品出村进城工程抓住了产业痛点、发挥了技术优势——蹚出乡村产业高质量发展新路径

【中国农网】近期，农业农村部印发了《关于拓展农业多种功能 促进乡村产业高质量

发展的指导意见》，要求发挥农村电商在对接科工贸的结合点作用，实施“互联网+”农产品出村进城工程，利用5G、云计算、物联网、区块链等技术，加快网络体系、前端仓库和物流设施建设，把现代信息技术引入农业产加销各个环节，建立县域农产品大数据，培育农村电商实体及网络直播等业态。本版邀请有关专家学者和业内人士就此进行了解读。

链接:

<http://agri.ckcest.cn/file1/M00/03/19/Csgk0WGrLSSATJuhAAnrvH3ych4067.pdf>

6. 吴孔明出席中巴生物技术、农业与可持续发展论坛

【中国农业科学院】11月23日，农业农村部党组成员、中国农业科学院院长吴孔明在京出席“第一届中巴（西）生物技术、农业与可持续发展在线论坛”，并就中巴农业生物技术合作发表演讲。会议由中国-巴西企业家委员会（CEBC）主办，中国驻巴西大使杨万明，中巴企业家委员会主席、巴西前驻华大使卡斯特罗·内维斯，巴西农业部副部长费尔南多·卡马戈，巴西农牧业研究院（Embrapa）院长赛尔索·莫莱提等出席会议。

链接:

<http://agri.ckcest.cn/file1/M00/03/19/Csgk0WGrKjeAMXv9AALyAlMkl6I027.pdf>

【文献速递】

1. Optimization of Nitrogen Fertilizer Application with Climate-Smart Agriculture in the North China Plain

文献源: Water,2021-12-03

摘要: Long-term excessive nitrogen fertilizer input has resulted in several environmental problems, including an increase in N_2O emissions and the aggravation of nitrate leaching; monitoring nitrogen fertilizer is crucial for maize with high yield. This study aimed to optimize the amount of nitrogen applied to maize by Climate-Smart Agriculture (CSA) so as to continuously improve agricultural productivity and reduce or eliminate N_2O emissions as much as possible. Field experiments with a completely randomized design were conducted to examine the effects of six nitrogen treatments (N application levels of 0, 120, 180, 240, 300, 360 $kg \cdot ha^{-1}$, respectively) on N_2O emissions, residual concentration of nitrate and ammonium nitrogen, maize yield, and nitrogen utilization efficiency in 2018 and 2019. The results indicated that the residual concentration of nitrate nitrogen ($-N$) in the two seasons significantly increased; N_2O emissions significantly increased, and the nitrogen fertilizer agronomic efficiency and partial productivity of maize fell dramatically as the nitrogen

application rate increased. The maize grain yield rose when the N application amount was raised (N application amount $<300 \text{ kg} \cdot \text{ha}^{-1}$) but decreased when the N application amount $> 300 \text{ kg} \cdot \text{ha}^{-1}$. An increase in the nitrogen application rate can decrease nitrogen use efficiency, increase soil $-N$ residual, and N_2O emissions. Reasonable nitrogen application can increase maize yield and reduce N_2O emissions and be conducive to improving nitrogen use efficiency. By considering summer maize yield, nitrogen use efficiency, and farmland ecological environment, $173.94 \sim 178.34 \text{ kg N kg} \cdot \text{ha}^{-1}$ could be utilized as the nitrogen threshold for summer maize in the North China Plain.

链接:

<http://agri.ckcest.cn/file1/M00/0F/EB/Csgk0GGrOnyAZFL6ADwH2Ayn5E8207.pdf>

2. NCs-Delivered Pesticides: A Promising Candidate in Smart Agriculture

文献源: International Journal of Molecular Sciences ,2021-12-02

摘要: Pesticides have been used extensively in the field of plant protection to maximize crop yields. However, the long-term, unmanaged application of pesticides has posed severe challenges such as pesticide resistance, environmental contamination, risk in human health, soil degradation, and other important global issues. Recently, the combination of nanotechnology with plant protection strategies has offered new perspectives to mitigate these global issues, which has promoted a rapid development of NCs-based pesticides. Unlike certain conventional pesticides that have been applied inefficiently and lacked targeted control, pesticides delivered by nanocarriers (NCs) have optimized formulations, controlled release rate, and minimized or site-specific application. They are receiving increasing attention and are considered as an important part in sustainable and smart agriculture. This review discussed the limitation of traditional pesticides or conventional application mode, focused on the sustainable features of NCs-based pesticides such as improved formulation, enhanced stability under harsh condition, and controlled release/degradation. The perspectives of NCs-based pesticides and their risk assessment were also suggested in this view for a better use of NCs-based pesticides to facilitate sustainable, smart agriculture in the future.

链接:

http://agri.ckcest.cn/file1/M00/03/19/Csgk0WGrNx2AbsnxABfNUyK_yVM527.pdf

3. 中药生态农业服务碳达峰和碳中和的贡献及策略

文献源：中国中药杂志,2021-12-02

摘要：碳达峰和碳中和已成为当今国内和国际政治经济活动的热点问题，实现“双碳”目标的过程将对国内各行业的结构与发展产生深远影响。中药生态农业在生产优质药材的同时注重生态系统的平衡和可持续发展，通常不用化学合成的肥料、农药及生长调节剂，重视农副产品的循环利用，减少废弃物输出，因而对生态环境的负面影响极小，是典型的低碳源和高碳汇农业。该文综述了中药生态农业在碳达峰和碳中和中发挥作用的机制与潜力，并选择典型模式为案例分析了中药生态农业减少碳源和增加碳汇的具体方式，进而提出加强中药生态农业及相关双碳理论和方法研究，为低碳高效发展指明方向；全面推进中药生产由化学农业向生态农业模式转变，提升碳中和贡献率的综合收益；探索建立中药生态农业碳汇补偿机制，为中药生态农业持续健康发展提供保障；加强中药生态农业及双碳理论及技术培训，继续提升中药生态农业持续发展能力的建议，以期为中药生态农业的生态功能及通过生态功能助力经济功能发展提供思考和借鉴。

链接:

http://agri.ckcest.cn/file1/M00/0F/EB/Csgk0GGrLZqAFZhGAAo3K_2zV2s634.pdf

4. Self-Powered Sensing for Smart Agriculture by Electromagnetic-Triboelectric Hybrid Generator

文献源：ACS Nano,2021-11-29

摘要：The lack of efficient, low-cost, distributed energy collection methods is a vital factor restricting the application of the Internet of Things (IoT) in smart agriculture. This paper proposes a method based on triboelectric nanogenerator and electromagnetic generator to realize self-powered IoT nodes and self-powered sensors at the same time. An energy harvesting and sensing device based on electromagnetic-triboelectric hybrid generator (ES-ETHG) is designed. The peak power of ES-ETHG is 32.4 mW, which can supply power to IoT nodes for a long time with power management circuits. In addition, ES-ETHG can critically measure wind speed and wind level within the range of 315 m/s, and accurately detect wind direction within 2 s. Furthermore, the self-powered distributed weather sensing system based on ES-ETHG is developed to realize the remote collection of wind speed, wind direction, temperature, and humidity. This work proposes a solution for developing self-powered IoT and sensor in the field of smart agriculture.

链接:

<http://agri.ckcest.cn/file1/M00/03/19/Csgk0WGrNRiAVsxVAKn7rQvxB1c888.pdf>

5. Real- Time Weather Monitoring and IoT- Based Palmtop Device for Smart Agriculture

文献源: SN Computer Science,2021-11-27

摘要: At present, the agriculture sector is moving towards smart agriculture for the proper crop and land management such as minimizing the use of irrigation water and the temperature in a greenhouse among many others. In agricultural fields, either outdoor or indoor, monitoring real-time weather is an important tool. A novel, handheld palmtop weather station that can measure ambient environmental parameters such as air temperature, humidity, barometric pressure, dew point, soil moisture level, and carbon monoxide in the atmosphere with high precision was developed and discussed in this paper. The device comprises an ATMEGA 2560 Microcontroller, a sensor panel, a power unit with rechargeable and removable batteries, an LCD display, and local and cloud storage with a customized web portal. An ergonomic cover was also designed for the device with a micro-USB charging port and a common port to connect external modular sensors such as a soil moisture sensor. As the device is an IoT-enabled device, the user can upload real-time data into a customized website with the location. Sensor accuracy tests were carried out for temperature and humidity with the available reference instruments and the response time of the device was also tested as it affects the performance of the device.

链接:

<http://agri.ckcest.cn/file1/M00/0F/EB/Csgk0GGrN8uAA9H4AAxYb-b-Q0A384.pdf>

6. 农业生态资本投资水平及其空间溢出效应研究

文献源: 中国地质大学学报(社会科学版),2021-11-20

摘要: 农业生态资本投资是农业生态环境治理的重要保障,是推动我国农业生态文明建设和绿色低碳发展的重要基础。本文运用熵权法对2004—2018年中国省域农业生态投资水平进行了测度,并基于四种不同空间矩阵构建的空间杜宾面板数据模型,对农业生态资本投资水平的空间格局及空间溢出效应进行分析。研究发现:(1)全国农业生态投资水平总体上呈现"东强-中次-西弱"的梯次格局,省域之间差距明显。(2)农业生态资本投资水平存在明显的空间集聚特征,东部地区呈现高高集聚特征,西部地区呈现低低集聚特征。(3)从空间溢出效应来看,农村经济发展程度、农村人力资本和技术水平对本地和邻近地区的农业生态资本投资具有促进作用。农村生态资源禀赋对本地区和邻近地区的农业生态资本投资具有负向影响。农村居民收入对本地区农业生态资本投资具有负向影响,对邻近地区影响不显著。在未来政策制定上从全局来看要着眼于区域差异化管理、跨区域农业生态资本投资合作。

链接:

<http://agri.ckcest.cn/file1/M00/03/19/Csgk0WGrLpSADQ2TAEoiw0cyX6I399.pdf>

7. Health Is Wealth: Study on Consumer Preferences and the Willingness to Pay for Ecological Agricultural Product Traceability Technology: Evidence from Jiangxi Province China

文献源: International Journal of Environmental Research and Public Health,2021-11-09

摘要: The application of traceability technology is an important way to solve food safety problems. Different traceability technologies bring different effects to consumers. Existing studies have not explored consumers' preferences in regards to product traceability technology applications, and they have not analyzed their willingness to pay. Therefore, this study focused on organic rice, an ecological agricultural product. The study was based on a survey from Jiangxi Province, China. It used a selective experiment method in order to analyze consumer preferences and the willingness to pay for ecological agricultural product traceability technology. The results show that consumer preferences are as follows: blockchain technology application attributes, traditional traceability-technology-application attributes, high credit-supervision attributes, and international-certification attributes. In terms of willingness to pay, consumers have the highest willingness to pay for the application of blockchain technology, which they are willing to pay CNY 21.902 more per kg for this attribute. At the same time, consumers are also willing to make additional payments for traditional traceability-technology-application attributes, high credit-supervision attributes, and international-certification attributes. Their willingness to pay is CNY 20.426, CNY 17.115 yuan, and CNY 11.049, respectively.

链接:

<http://agri.ckcest.cn/file1/M00/0F/EB/Csgk0GGrNdGAAEtYAAXybfwowVc814.pdf>

8. Exploring Twitter Discourse around the Use of Artificial Intelligence to Advance Agricultural Sustainability

文献源: Sustainability,2021-10-31

摘要: This paper presents an exploration of public discourse surrounding the use of artificial intelligence (AI) in agriculture, specifically related to precision agriculture techniques. (1) Advancements in the use of AI have increased its implementation in the agricultural sector, often framed as a sustainable solution for feeding a growing global population. However,

lessons learned from previous agricultural innovations indicate that new technologies may face public scrutiny and suspicion, limiting the dissemination of the innovation. Using systems thinking approaches can help to improve the development and dissemination of agricultural innovations and limit the unintended consequences of innovations within society. (2) To analyze the current discourse surrounding AI in agriculture, a content analysis was conducted on Twitter using Meltwater to select tweets with specific reach and engagement. (3) Seven themes resulted from the analysis: precision agriculture and digital technology innovation; transformation and the future of agriculture; accelerate solutions, solve challenges; data management and accessibility; transforming crop management, prioritizing adoption; and AI and sustainability. (4) The discourse on AI in agriculture on Twitter was overwhelmingly positive, failing to account for the potential drawbacks or limits of the innovation. This paper examines the limits of the current communication and outreach across environmental, economic, social, cultural, political, and behavioral contexts.

链接:

http://agri.ckcest.cn/file1/M00/03/19/Csgk0WGrOIWAaK3aAA1aGH7GJ_A487.pdf

9. Big data in agriculture: Between opportunity and solution

文献源: Agricultural Systems,2021-10-21

摘要: Big data applications in agriculture evolve fast, as more experience, applications, good practices and computational power become available. Actual solutions to real-life problems are scarce. What characterizes the adoption of big data problems to solutions and to what extent is there a match between them? OBJECTIVE: We aim to assess the conditions of the adoption of big data technologies in agricultural applications, based on the investigation of twelve real-life practical use cases in the precision agriculture and livestock domain. METHODS: We use a mixed method approach: a case study research around the twelve use cases of Horizon 2020 project CYBELE, varying from precision arable and livestock farming to fishing and food security, and a stakeholder survey (n = 56). Our analysis focuses on four perspectives: (1) the drivers of change that initiated the use cases; (2) the big data characteristics of the problem; (3) the technological maturity level of the solution both at start and end of the project; (4) the stakeholder perspective. RESULTS AND CONCLUSIONS: Results show that the use cases' drivers of change are a combination of data-, technology, research- and commercial interests; most have at least a research drive. The big data characteristics (volume, velocity, variety, veracity) are well-represented, with most

emphasis on velocity and variety. Technology readiness levels show that the majority of use cases started at experimental or lab environment stage and aims at a technical maturity of real-world small-scale deployment. Stakeholders' main concern is cost, user friendliness and to embed the solution within their current work practice. The adoption of better-matching big data solutions is modest. Big data solutions do not work out-of-the-box when changing application domains. Additional technology development is needed for addressing the idiosyncrasies of agricultural applications. SIGNIFICANCE: We add a practical, empirical assessment of the current status of big data problems and solutions to the existing body of mainly theoretical knowledge. We considered the CYBELE research project as our laboratory for this. Our strength is that we interviewed the use case representatives in person, and that we included the stakeholders' perspective in our results. Large-scale deployments need effective interdisciplinary approaches and long-term project horizons to address issues emerging from big data characteristics, and to avoid compartmentalization of agricultural sciences. We need both an engineering perspective to make things work in practice and a systems thinking perspective to offer holistic, integrated solutions.

链接:

<http://agri.ckcest.cn/file1/M00/0F/EB/Csgk0GGrL22AbconABUftLgQ3dA118.pdf>

【会议论文】

1. Big Data based Agricultural Intelligent Comprehensive Service Platform

发布源: IEEE

发布时间: 2021-12-01

摘要: Agricultural modernization is the foundation and support for the realization of national modernization. In recent years, China's rural information service system has accelerated its improvement, and modern agriculture integrating online and offline has accelerated. However, there is still a problem of weak infrastructure. In response to the above problems, based on the full study of existing solutions, with the help of advanced technologies such as big data, Internet of Things, and artificial intelligence, this paper proposes a multi-dimensional big data aggregation technology throughout the agricultural industry chain, and designs an integrated agricultural intelligent service platform.

链接:

<http://agri.ckcest.cn/file1/M00/03/19/Csgk0WGrVTuALzJVACOUz0RpvTs682.pdf>

2. The Construction of Agricultural Big Data Ecosystem Based on “Internet +”

发布源: IEEE

发布时间: 2021-11-13

摘要: With the social and economic development and the government's attention, the study on the advancement of the development of the agricultural “new six industries”, which is an innovative practice to promote the integrated development of rural primary, secondary and tertiary industries, is of great significance for accelerating the transformation of agricultural development methods, promoting high-quality agricultural development, and accelerating the pace of agricultural and rural modernization. By analyzing the problems of the current “Internet +” agricultural “new six industries”, relying on information technologies such as computers, the Internet, the Internet of Things, and big data, this paper proposes a path for the construction of the “Internet +” agricultural big data ecosystem, designs the platform architecture, and elaborates the system structure and key technology of the platform. Through the construction and exploration of the platform, the optimization and promotion of the agricultural “new six industries” industrial structure has been achieved, providing theoretical exploration and technical support for the development of the “new six industries” smart business.

链接:

<http://agri.ckcest.cn/file1/M00/03/19/Csgk0WGrVyuAF49YAA1u88X6HbE678.pdf>

3. BIoT: Blockchain based Smart Agriculture with Internet of Thing

发布源: IEEE

发布时间: 2021-08-19

摘要: Despite what the media can have us to think, blockchain has a broad range of applications outside of cryptocurrencies. From health resources to regulation, real estate, and finance, innovation is poised to transform a wide variety of industries. In any case, agriculture is a little-studied industry that blockchain might completely transform. Our general public is supported by this massive sector, which does not be as appealing as banking or medical facilities. More importantly, it has a slew of issues that need to be addressed right away. With the use of information technologies, we expect the agricultural sector can become more secure, transparent, trustworthy, and constructive. The proposed model combines AI, IoT, and Blockchain to develop a smart and futuristic agricultural system that provides farmers with a secure and open transaction approach to rich, new, and

effective decision support that can specifically create the scope of greater agricultural process productivity and help farmers maximize their benefits. And we believe that the agricultural sector will benefit from the benefits of information technology.

链接:

<http://agri.ckcest.cn/file1/M00/03/19/Csgk0WGrVnmAb6fyABCxV9K2bow778.pdf>

4. Research on Agricultural Products Intelligent Recommendation Based on E-commerce

Big Data

发布源: IEEE

发布时间: 2021-04-23

摘要: As an effective method to solve the problem of information overload, intelligent recommendation has become a necessary condition for e-commerce of agricultural products. The research on intelligent recommendation of agricultural products has made a series of important progress, but also faces new challenges with the rapid development of e-commerce of agricultural products and the arrival of the era of big data. In this paper, we first summarize the characteristics of intelligent recommendation of agricultural products. Second, we introduce the research status of intelligent recommendation of agricultural products based on e-commerce big data from four aspects: user behavior mining, commodity information utilization, recommendation algorithm design and evaluation of agricultural products recommendation. Then we point out the shortcomings and difficulties in the current research. Finally, we prospect the future development direction. The purpose of this paper is to promote the development of e-commerce of agricultural products.

链接:

<http://agri.ckcest.cn/file1/M00/03/19/Csgk0WGrVdeAGJMoADTG-vEKhK4215.pdf>

【相关专利】

1. 一种基于智慧农业的蚕豆收割除渣设备

发布源: 中国专利

发布时间: 2021-11-19

摘要: 一种基于智慧农业的蚕豆收割除渣设备,包括外壳、收割处理部分和储存收集部分;外壳上安装有四个行动轮,可在蚕豆地里行走;收割处理部分和储存收集部分安装在外壳内,储存收集部分位于收割处理部分的下端,收割处理部分将蚕豆秧连根拔起,并将秧上的蚕豆角与蚕豆秧分离,然后将去掉蚕豆角的秧运输到设备外,蚕豆角掉入到储存

收集部分中,储存收集部分对蚕豆角进行处理分离,最终获得干净的蚕豆粒,并将蚕豆粒装袋;本发明提供了一种基于智慧农业的蚕豆收割除渣设备,提高工作效率的同时,解放人力,保证收割质量,提高农民收益。

链接:

<http://agri.ckcest.cn/file1/M00/03/19/Csgk0WGrU8eAEuRDABVRIzvkeX8430.pdf>

2. 一种基于农业大数据用智能化控制装置

发布源: 中国专利

发布时间: 2021-11-09

摘要: 本发明公开了一种基于农业大数据用智能化控制装置,涉及防护技术领域,针对现有的控制器裸露在外界,不能进行防护的问题,现提出如下方案,其包括防护箱,所述防护箱的前、后均转动连接有盖板,所述盖板的上侧滑动连接有传送机构,所述防护箱的外侧上端固定连接与传送机构连接的收卷机构,所述防护箱的内侧设置有控制器本体,所述控制器本体的下侧设置有多个支撑块,多个所述支撑块的下侧均固定连接与滑动机构,所述支撑块的上侧转动连接有连接杆,所述连接杆的上端转动连接有与控制器本体配合的转动杆,本发明结构简单,可以使得控制器得到最大程度的保护,防止外力撞击,使得控制器位移过大,防止损坏控制器,操作简单,使用方便。

链接:

<http://agri.ckcest.cn/file1/M00/0F/EB/Csgk0GGrVEOADPxfAAjCQSeQzfk003.pdf>

主编: 赵瑞雪
地址: 北京市海淀区中关村南大街12号
电话: 010-82106649

本期编辑: 陈亚东
邮编: 100081
邮件地址: agri@ckcest.cn