Corn Cultivation Technology based on Internet of Things Control

Yaojun Wei

Guangxi Timecool Ecological Agriculture Co., Ltd., Liuzhou, China.

445972832@qq .com

Abstract

In order to solve the problem that it is difficult to control the amount of nitrogen fertilizer in the production process of sweet corn, this paper takes the corn cultivation process in Liuzhou, Guangxi, as an example, and makes in-depth analysis on the improvement of quality and efficiency of sweet corn cultivation with the help of the Internet of Things control technology. The analysis results show that the Internet of Things control technology can change the traditional stage fertilization into on-demand fertilization, and change the fertilizer operation strategy in the corn production process to reduce the amount of fertilizer, Reduce costs, improve production efficiency and the quality of fresh sweet corn, and provide technical support for large-scale planting and production of crop.

Keywords

Internet of Things; Corn; Precision cultivationr.

1. Introduction

The cultivation of corn is just at the late stage of milk ripening, when the dry soluble sugar content is not less than 10%, it is mainly used for fresh food. Precise control of the surrounding environment is conducive to the use of corn, which has the advantages of sweet taste, low fat content and high cellulose content. It is popular in the market and has become a staple food commonly used by people.[1-3] In recent years, China's corn industry is growing rapidly, the precision cultivation industry chain has been initially promoted, and the market demand and planting area are increasing. However, at present, there is little research on precise control of maize cultivation technology in production, and there is no corresponding supporting cultivation technology to provide technical support and technical guarantee. In maize production, many problems such as excessive nitrogen fertilizer consumption and poor quality have emerged, and the bottleneck of maize development has gradually emerged. Aiming at this problem, combined with the need to accurately control the cultivation process during the corn growth period, the Internet of Things (IoT) maize control effect cultivation technology was proposed through the experimental research in 2017 – 2019. This technology realizes the precise control of fertilizer for corn, reduces the number of agricultural machinery operations, and reduces the production cost.[4-6] At the same time, it solves the problem of yield reduction caused by people missing the best topdressing period to monitor the rapid growth of corn in rainy days, and provides technology for large-scale planting and industrial development of agricultural special production.

2. Precision seeding

Select suitable corn cultivation land according to the actual situation of the planting land. On the one hand, it is necessary to consider whether the planted corn varieties are suitable for the market demand and application mode, and consider the adaptability of the varieties and whether they meet the climate conditions of the planting area, and then install the Internet of Things system equipment. Corn with purity of more than 99%, purity of 0100% and germination rate of more than 97% is selected for planting, which is conducive to accurate monitoring of the Internet of Things., The seeds should be

coated to prevent the corn from being vulnerable to underground pests during the emergence period. The sensor of the Internet of Animals should be moved. Two days before sowing, the seeds should be coated with Syngenta Mansijin+Ruisheng according to the corn seeds to prevent corn diseases and underground pests.[7]

Considering that the quality of sweet corn seeds is relatively light and the soil arching ability is weak, it is required that the soil temperature of 2cm ～ 6cm be stable to 22 ℃ for 7 consecutive days before sowing. Taking Liuzhou cultivation in Guangxi as an example, sowing generally starts in October, and the latest sowing date is not more than December. In production, sowing can be carried out by stages. The planting area and sowing date can be reasonably determined according to the market demand, and sowing can be carried out every 10 days.

It is required to plant one seed per hole, and the planting density is 3500 plants per mu to ensure that the number of effective ears reaches 3600 ears. Mechanical seeding requires uniform row speed, uniform seeding depth, plant spacing and row spacing, which is conducive to the installation of IoT equipment, so that the error is less than 1 cm. Mechanical equipment shall be used to suppress the sown fields. The speed of the locomotive shall be as slow as possible. The degree of suppression shall be 4cm when the foot steps on the soil.

The post seedling stem and leaf treatment can be used for weeding in maize seedling field. When the post seedling stem and leaf are about 4 leaves, grass weeds are 4 leaves, and broadleaf weeds are 3 leaves, one-time post seedling weeding can be carried out, and then Internet of Things equipment can be installed. Spray in windless weather with temperature above 22 ℃. With the use of pesticide additives, the Internet of Things sensor can effectively reduce the amount of herbicides in corn fields and increase their efficiency. For example, new pesticide additives such as organosilicon, lecithin, and vegetable oils can reduce the amount of pesticide application by about 25% in post seedling stem and leaf treatment. For weeds in the field, about 90% atrazine 1000g/hm2+30% oxazolone 75 mL/hm2 silicone additives can be used to weed.

Due to the high sugar content of corn, the prevention and control of corn borer through Internet of Things sensors is the focus of pest control. Once it happens, it will have a lot of impact on the yield of corn. The corn borer should focus on prevention. The specific method should be selected according to the production needs and the production conditions of farmers. The common method is to release trichogramma thrice in the early stage of corn borer eggs; At the end of the heart leaf stage, the field self-propelled high pole spray was used to spray the wettable powder at a dosage of 30g per mu; When 20% of the maize is male, the plane leaves spray 2.5% beta cypermethrin or 3% deltamethrin or 12% cypermethrin or 7% cis fenvalerate per mu.

After the powder is dispersed, it is vulnerable to aphids. Before its spread, it is necessary to spray medicine to prevent aphids. Every hectare, 75% imidacloprid water is used for dispersion cultivation, and about 17g of plant granule protection agent, or 60g of imidacloprid suspension agent, or 600mL of 5% acetamiprid emulsifiable concentrate. The water is mixed by machinery and equipment, and spray is carried out by air. At the initial stage of maize disease, broad-spectrum fungicides with internal absorption can be used, such as 200mL of 3% Junkeduke water agent, or 1000g of 75% methylthiophanate foliar fertilizer spray. Spray irrigation from top to bottom at the heart leaf of corn, and spray about 70mL of liquid medicine on each corn plant.

At present, most of the sweet corn harvesting areas use manual harvesting, which is inefficient. The rainy weather affects the harvesting. At present, large-scale planting cooperatives use mechanical harvesting with high efficiency. Although the labor cost can be saved by 100 yuan per mu, the labor cost in the cultivation process is too high.

3. Deployment of IoT equipment

After planting sweet corn and waxy corn, the Internet of Things needs to be installed in isolation, which can ensure that the direct feeling of pollen affects the quality and taste. Selecting an isolation area is the primary condition to ensure the quality of corn in the whole field. Space isolation installation means that sweet corn fields will not be polluted by other corn pollens through space distance. Generally, it is ensured that a sensor is installed at least within 200m. Regular inspection means that the flowering period of sweet corn should be more than 20 days apart from that of ordinary corn. In combination with the characteristics of low temperature tolerance and short growth period of sweet corn seeds, late sowing is generally adopted to stagger the flowering period of other corn, which can ensure that the IOT equipment can be monitored 24/7.

The sensor installed near the corn is protected by using natural and man-made obstacles. The isolation installation of planting sweet corn is the most basic and critical point to ensure the corn quality. If problems occur, the corn quality of the whole field will be affected.

Proper harvesting of maize is the premise to ensure its quality and yield. The fresh ear quality in the optimum harvesting period of maize should have the characteristics of the variety and the same ear shape and grain type. The grains should have the color, luster, plump, tender when the variety is milk ripe, and there is serous exudation when pressing. In general, 23 days after pollination, the milk maturity of sweet corn before the formation of milk line is appropriate, and the grain water content is about 70. After 20 days of flowering and pollination, the sensor monitors the maturity of corn every day, and reminds the market or processing time in the optimal picking period through the system to avoid affecting the taste and nutrition. It must be completed within 3 days from the time of collection to the completion of processing, at the latest no more than 7 days, and stored in a constant temperature room. The storage time at a higher temperature is too long, so as not to affect the taste. After harvesting, the sensor needs to be taken back for detection and used for the next cultivation monitoring.

4. Conclusion

At present, the large-scale and industrialized market of corn has been formed. With the rapid development of modern information technology, the demand for corn has gradually increased. However, efficient cultivation technology is still lacking and the application scope is not wide enough. The cultivation technology of improving corn efficiency through the Internet of Things is integrated with sensors and system analysis. It provides a more effective means for corn cultivation technology, and also provides a reference for the cultivation of other crops.

References

[1] An Wenbo, Sun Yanxin, Li Zhantai, et al. Effects of different slow and controlled release fertilizers on yield, quality and ammonia volatilization of fresh corn [J]. Journal of Applied Ecology, 2020, 31 (7): 2422-2430.

[2] Chen Wei. Research on the Development Status and Countermeasures of China's Corn Planting Industry [J]. China Hi tech, 2018 (20): 6-8.

[3] Chen Yongxin, Zhai Guangqian, Chen Lin, et al. Technical Regulations for Cultivation of Fresh Glutinous Corn in Shanxi Province [J] Agricultural Science and Technology Communication, 2015 (1): 95-97.

[4] Smart Agriculture Helps Rural Revitalization Analysis of Smart Agriculture Development Trend in 2018 [J]. Agricultural Engineering Technology, 2018, 38 (27): 60-64.

[5] Zheng Meixin, Liang Shengkan, Zhang Liwei, Qin Jianfeng, Liang Chun, Wei Danni. Analysis on the Current Situation and Countermeasures of Guangxi Agricultural Reclamation Smart Agriculture Development [J]. Agricultural Research and Application, 2018, 31 (04): 49-53.

[6] Zhou Kang. Research on Smart Agriculture Development under the Background of Artificial Intelligence [J]. Rural Science and Technology. 2018 (20) 54-55.

[7] Niu Yan, Qin Guojie, An Xiaoning, Ke Xiaowei, Gao Lei. Research on Smart Agriculture Development Strategy Based on Internet of Things Technology [J]. Shanxi Agricultural Economy, 2018 (12): 1.