

High-yield Cultivation Technology of Regenerated Rice in Boluo County

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Abstracts: Regenerated rice is a planting mode that uses the dormant buds surviving on the rice stump after rice harvest to harvest another season, which is conducive to improving the replanting index and the comprehensive production capacity of rice fields, and optimizing the grain structure. This paper mainly includes regeneration rice cultivation technology varieties selection, sowing seedlings, fertilizer management, pest and disease control, post-harvest management of first-season rice and regeneration rice management, with a view to providing reference for growers and technical support for the promotion and application of the regeneration rice model in Boluo County.

1. Introduction

Regeneration rice is planted a crop of rice harvested two crops, the use of first season rice harvested after the axillary buds on the rice stakes continue to sprout into seedlings, through scientific management, so that their spikes and fruiting and then harvested a new season of rice. Regeneration rice has the advantages of high daily yield, short fertility period, low production cost, high benefits, etc. It is one of the measures to increase the rice yield and economic income per unit area of paddy field in southern China's rice area^[1].

Boluo County, Huizhou City, Guangdong Province, is a large agricultural county with rich natural resources of mountains and rivers such as Luofu Mountain and Dongjiang River, fertile soil, four seasons like spring, and an average annual temperature of 21°C^[2]. Rice is an important grain crop in Boluo County. According to the data of Boluo County Statistics, in 2022, the sown area of grain in Boluo County will be about 30,000 km², with an output of about 160,000 tonnes, of which, the sown area of rice will be about 22666 km², with an output of more than 120,000 tonnes. At present, the main planting system of rice cultivation in Boluo County is "one season of early rice + one season of late rice", and the cultivated rice varieties are mainly high-quality silk seedling rice^[3].

To sum up, the adoption of regenerative rice planting technology can effectively improve rice yield and mechanization, but also improve planting indicators, save costs and efficiency, and provide enough time for the next season's crop growth. The relevant departments in Boluo County gradually promote the application of recycled rice planting technology, which can better protect the

basis of national food security^[4].

2. First season rice

2.1 Field selection

High-yield rice cultivation requires proper water, especially during the first season before rice harvest. This is the growth differentiation and regeneration buds of rice, and lack of water can easily lead to water loss and hinder regeneration bud differentiation and growth^[5]. Therefore, rice cultivation needs to meet shallow irrigation during the first season and at night to ensure water availability. At the same time the development of regeneration rice must also ensure a certain amount of fertilizer, pesticides and other inputs^[6]. Therefore, the planting of regeneration rice should choose the field with good temperature and light conditions, good fertility, sufficient water, irrigation and drainage, good traffic conditions, and easy to operate agricultural machinery^[7].

2.2 Variety selection

Selecting and breeding excellent varieties, which is an important factor for the success of rice regeneration production, the first season rice and recycled rice is an "organic fusion", starting from the first season rice, rice regeneration has laid a good foundation for high yield, excellent rice has great advantages in quality, yield, regeneration ability, resistance to leaf fall, emergence, resistance to low temperature, cold, high temperature, heat damage, etc. It has passed the national certification and is suitable for planting middle and early maturing rice varieties in Boluo County. The early and medium maturing varieties that are resistant to low temperature and cold damage at the seedling stage, resistant to high temperature at the sprouting and fruiting stages of the regeneration season, have high yield and have passed the national certification and are suitable for planting in Boluo County. Such as: Ye xiang you li si, Qing xiang you 19 xiang, Han you 113, Tai you yue he si miao, Nan jing xiang zhan, 19 xiang, Mei xiang zhan No. 2 and so on^[8].

2.3 Sowing

The first season of rice for storing regeneration rice must be sown early to ensure that the tasseling and flowering is completed before the high temperature and drought, and the general fertility period of the first season of rice is about 130 days, the fertility period of regeneration rice is about 90 days, and the fertility period of the two seasons is about 220 days^[9]. Because every year in early October, Boluo County will appear cold dew wind weather, sowing must be completed before March 10, before sowing, use 2% of 84 disinfectant solution or 2.5% sodium hypochlorite to soak disinfected rice seeds for 30 minutes, rinse clean for seed soaking and germination, the conventional rice machine transplanted rice planting amount of 45-60 kg/hm², hybrid rice machine transplanted rice seeding amount of 22.5-30 kg/hm². 4-5 plants per hole for conventional rice and 2-3 plants per hole for hybrid rice^[10].

2.4 Cultivate strong seedlings

In order to ensure that the seedlings are strong, you can use the film to cover the small arch, during the period to strengthen the water and temperature control, to prevent high-temperature scorching seedlings, about 15 days to remove the film, the age of the seedlings is controlled at 25-30 days. Three days before transplanting, the application of "grafting medicine", per 667m² uniform spray 20% tricyclazole 100 g + 20% triazophos 200 ml + 25% pyrithioxin 20 g+30 kg

water, can effectively prevent rice blast, rice fly and stem borers and other pests and diseases^[11]. If the planter finds that the seedling performance is poor, the "grafting fertilizer" can be applied 5 days before transplantation, and the urea application of 3kg per 667m² is appropriate^[12].

2.5 Transplanting

Planters should do a good job of field leveling before transplanting, and soak the field with water 7 days before transplanting, and the depth of water should be kept at about 15 cm. Planters can choose leaves with leaf age of 4-6.5, seedling height of about 15cm, leaf color bright green, leaves without yellow leaves, no pests and diseases, good root, seedling block forming seedlings for transplanting, transplanting depth of about 2cm^[13]. Appropriate dense planting is conducive to improving the number of tillers and spikes of regenerated rice, generally 270,000-315,000 holes/hm²^[14].

2.6 Scientific management

2.6.1 Fertilizer application

The fertilization time and fertilizer requirement of regenerated rice are higher, and the planters should choose all-alkali fertilizer, 45% ternary compound fertilizer 450-600 kg/hm², urea 75-150 kg/hm², and uniform tillage. The second is to chase the stump fertilizer early, 7 days after transplanting, apply urea 75-150 kg/ hm²^[15]. Thirdly, the planter should apply sufficient germination fertilizer 15 days before harvest, applying 45% compound fertilizer 150 kg/hm² and urea 75 kg/hm²^[16].

2.6.2 Irrigation

Rice irrigation should follow the principle of "shallow water for planting seedlings, inch of water for living trees, thin water for tillering, enough seedlings for baking, deep water for tasseling, and alternating wet and dry in the late stage". The first season of rice tiller fertilizer to keep the field in shallow water, to promote tiller. 20 days after planting, when the number of seedlings reached 2.7 million to 3 million plants /hm², farmers should drain and dry, control the occurrence of ineffective tillering, and promote the growth of rice roots. In the middle and late stages of rice growth, shallow water and diligent irrigation are used to improve root vigour and the deployment and transfer of substances in the stalks^[17]. Water is cut off 7 days before maturity to facilitate harvesting^[18].

2.6.3 Weed control

Reasonable selection of weeding techniques and herbicides is made for weeds in the field.^[19] Before transplanting, soil closed weeding is carried out, sprinkled after the field is finished, and 30% propamocarb emulsifiable concentrate 1.5 L/hm² and 10% bensulfuron wettable powder 330 g/hm² are mixed^[20]. After 15-20 days of transplanting, farmers use 600g/hm² of 30% seedling grass net wettable powder plus 2-500kg water, spray evenly, establish a shallow water layer after 24h, and store for 2-3 days, which can ensure the weed control effect.^[21]

2.6.4 Pest and disease prevention and control

In Boluo County, the pests and diseases that generally need to be controlled in the first season rice include stem borer, rice leaf roller, rice planthopper, rice blast, and stripe blight, etc., and drones can be utilised to carry out multiple treatments with one spray.^[22] In the tiller stage, pregnancy spike stage and spike flushing stage, due to the high leaf area coefficient and poor

ventilation and light transmission conditions, 75% tricyclazole 465 g/hm², 5% wellbutrin 360 g/hm², 20% chlorpyrifos 165g/hm² can be used to evenly spray and control rice blast, blight, longitudinal leaf borer, stem borer and so on. In the late stage of growth, 80% enidazolinone 240 g/hm² and 40% Fushi No.1 1.5 kg/hm² can be used to prevent and control rice spike and neck plague and rice planthopper.^[23]

2.7 First season rice harvest

In Boluo County, generally around 10 July, when 90% of the first-season rice is mature and 70% of the plants' inverted second and third node shoots reach 2cm or more, it is timely harvested.^[24] The appropriate height of the stakes is conducive to the growth of rice regeneration buds, and the height of the stakes will be controlled at about 30cm when harvesting, because too high or too low is not conducive to the improvement of regeneration rice yield. When we use the machine to harvest, we should pay attention to the direction of the route, take a large rectangular cross-field operation, and reduce the crushing damage of the harvester on the stubble.^[25]

3. Regeneration Rice

3.1 Irrigation

Water management of regenerated rice is closely related to the height of staking.^[26] After the first harvest of rice in the high temperature season, farmers should restore and maintain the water layer of 5cm in the land, so as to improve the live bud rate and seedling emergence rate, maintain the water layer of about 10cm in the earing and flowering period, and alternate shallow wet in the late filling period.^[27] It is convenient to improve the vigour of the root system and leaves, and promote the fullness of the seed grouting.^[28]

3.2 Fertilizer

The nutrients required for the sprouting and growth of regeneration buds come from the carbohydrates stored in the mother stem and the mineral nutrients absorbed by the root system.^[29] In addition to fertilization at the later stage of rice growth in the first season, farmers can also supplement urea 90kg/hm² and 45% compound fertilizer 135kg/hm²-7 days after the first season rice harvest to promote the growth of regenerated buds and orderly emergence. Spraying potassium dihydrogen phosphate foliar fertilizer can be applied during the period of pregnancy,^[30-31] preventing early failure and increasing the fruiting rate and grain weight. In the late growth period, if there is a cold wind, spray "920" plant growth regulator 30 g/hm² in the tassel period to reduce necking and improve the neatness and fruiting rate.^[32]

3.3 Insect prevention

We can observe that the rice leaves in the regeneration season are short, the field ventilation and light transmission conditions are good, and the disease and pest control of rice in the first season can be in place.^[33] If the source base of insects (diseases) in the field is high, and there are still diseases and pests, early prevention and control should be done.^[34] Prevention and control methods are the same as the first season rice.^[35]

3.4 Harvesting

Due to the uneven ripening of the regenerated rice, there are mature and immature grains in the

field, and the harvest period of the regenerated rice should not be too early, when more than 90% of the buds are mature.

4. Conclusion

Based on the natural climatic conditions, geographic location, planting system and planting conditions of Boluo County, combined with the reproductive characteristics of regenerated rice, Boluo County is suitable for the development of regenerated rice high-yield cultivation technology. The high yield cultivation technology of regenerated rice can reduce rice planting process, improve crop yield index, and coordinate the conflict between three crops, which has a broad development prospect. By comprehensive use of scientific data, we can clarify the relationship between first-season rice and first-season rice, dynamically adjust the growth conditions of rice, and realize the increase of yield per unit area.

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