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Practice of Rice and Shrimp Ecological Culture Technology: Taking Jiangsu Leshui Culture Co., Ltd. as an Example

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Abstract: In order to promote the development of rice and shrimp industry, Binhai County, Yancheng city began to implement rice and shrimp ecological culture in a base. Jiangsu leshui Culture Co., Ltd. carried out rice and shrimp ecological culture practice for more than one year from 2020 to 2021. Now this paper summarizes the culture practice, and mainly describes the rice field selection conditions, engineering transformation and construction of rice and crayfish (Procambarus clarkii) Crayfish breeding and management and crayfish seedlings and other key technical requirements, in order to provide technical reference for the majority of aquatic practitioners.

1. Introduction

The organic combination of rice planting and crayfish breeding has been studied and applied for many years and has high popularization value [1-3]. In Binhai County, Jiangsu Province, rice and shrimp breeding technology is one of the high-efficiency agricultural production models developed in recent years. With the improvement of living standards, people pay more and more attention to the quality and safety of agricultural products [4].In order to ensure the safety of the tip of the tongue, China is vigorously promoting the comprehensive planting and breeding technology of rice and fishery, and has issued a series of supporting policies to promote rice through fishery, stabilize grain and increase income. Jiangsu leshui Culture Co., Ltd. uses the original rice field to carry out rice and shrimp culture. The rice field is cultured with Procambarus clarkii and planted with one season of rice. During the rice planting period, Procambarus clarkii and rice grow together in the rice field, realizing stable grain quality and efficiency. This paper summarizes and explores the planting and breeding technology of rice and shrimp, in order to provide basic data for realizing the high-quality development of fishery [5].

2. Implementation Location and Scale

The implementation site is Jiangsu leshui aquaculture Co., Ltd., Binhai County, Yancheng City, Jiangsu Province, with a rice and shrimp ecological aquaculture area of 200 mu. Specifically, the 200 mu paddy field will be transformed into four breeding fields. Rice field base water circuit tee,

cohesive soil, and the plot is watertight. The water source is sufficient, the water quality is fresh, and there are no polluting enterprises around.

3. Specific Implementation

Shrimp paddy field should have a good ecological environment and be far away from pollution sources; The sediment has natural structure and good water retention performance, and is not submerged by flood. The limit of toxic and harmful substances meets the requirements of GB / T184074 required paddy fields. Sufficient water source, convenient drainage and irrigation, and the water quality shall meet the requirements of GB11607 and NY5051-2001 [4].There is no limit to the size of the area. Generally, 33500m^2 is suitable as a unit.

3.1. Rice Field Transformation

Trenching: excavate a circular ditch along the outer edge of the paddy ridge to 7-8m inside the paddy field. The dike foot is 2m away from the ditch. The ditch is 3-4m wide and 1-1.5m deep. A channel with a width of no less than 3m shall be reserved for the annular ditch of each pool without excavation, so as to facilitate the access of mechanical equipment. The gutter area shall not exceed 10% of the paddy field area.

Ridge building: use the soil excavated from the excavation of annular ditch to strengthen, heighten and widen the ridge. When the ridge is reinforced, each additional layer of soil shall be compacted. The ridge is 0.6-0.8m higher than the field surface, and the top is 2-3m wide. A 0.3m wide and 0.3m high earth ridge is built between the field surface and the ring ditch to separate the shrimp ditch from the field surface.

Escape prevention facilities: escape prevention nets shall be set on the drainage outlet of rice field and ridge. The anti escape net at the drainage outlet shall be 60 mesh. The anti escape net on the ridge can be made of cement tile and anti escape plastic film, and the anti escape net is 0.4m high.

Water inlet and drainage facilities: the water inlet and outlet are respectively located at both ends of the rice field. The water inlet channel is built on the ridge at one end of the rice field. The water inlet is filtered with 80 mesh long mesh bags to prevent enemy and harmful organisms from entering with the water flow. The drainage outlet is built at the lower part of the circular ditch at the other end of the paddy field. The rice field transformation of leshui breeding company has been completed according to the above requirements before carrying out the ecological breeding of rice and shrimp. If it is a new farmer, it is recommended to carry out the rice field transformation after the harvest of the rice field to prepare for the breeding in the coming year.

3.2. Breeding Process

3.2.1. Breeding Mode of Young Shrimp

From September to October every year, after the harvest of mid season rice, the paddy field should be irrigated immediately. 15000-30000 young shrimps with a specification of 1.0cm should be put into every mu, and the young shrimp culture mode should be put in. Commercial shrimps should be developed through two stages: young shrimp cultivation and adult shrimp cultivation.

3.2.2. Juvenile Shrimp Breeding Site

a) A young shrimp breeding area is built in the paddy field with 20 mesh nets. The young shrimp cultivated in each mu of breeding area can be used for breeding in 20 mu of paddy field.

b) The water depth of paddy field shall be 0.3m-0.5m.

c) Aquatic plants shall be transplanted in the cultivation area. Aquatic plants include submerged plants (Potamogeton crispus, Potamogeton, verticillata verticillata, etc.) and floating plants (water hyacinth, water peanut, etc.). The area of submerged plants shall be 50% - 60% of the area of the cultivation pool, and the area of floating plants shall be 40% - 50% of the area of the cultivation pool and fixed with bamboo frames. For those with rice stubble, only floating plants can be transplanted for young shrimp to inhabit, molt, hide and feed.

d) Fat and water. Seven days (days) before the release of young shrimp, fermented and decomposed farm manure (cow manure, chicken manure and pig manure) shall be applied in the cultivation area, with the dosage of 100kg-150kg per mu, so as to cultivate palatable natural bait organisms for young shrimp.

3.2.3. Young Shrimp Feeding

a) Transport of young shrimps. The young shrimps are transported with water and oxygenated with double-layer nylon bags. According to the distance, 5000-10000 young shrimps are packed in each bag.

b) Launch time. Young shrimps should be put in sunny morning, evening or cloudy day to avoid direct sunlight.

c) Release density.300000-600000 young shrimps with a specification of 1.0cm should be put into each mu of the cultivation area.

d) Precautions. When packaging, transporting and feeding young shrimps, the operation of leaving the water shall be avoided. When the young shrimps are transported to the cultivation area, they shall be subject to bubble bag temperature regulation, and the temperature difference shall not exceed 2 ℃.

3.2.4. Feeding and Management of Juvenile Shrimp in the Breeding Stage

a) Feeding: on the first day of feeding, young shrimps are fed with animal feed such as minced fish, minced snail and mussel meat, and leftovers from slaughterhouses (hereinafter referred to as "animal feed").Feed shall comply with the provisions of GB13078 and NY5072 and NY5072.Feed 3-4 times a day. In addition to feeding once in the morning, afternoon and evening, if possible, it is advisable to add once at midnight. The daily feeding amount is generally 5%-8% of the total weight of young shrimp. The specific feeding amount should be flexibly controlled according to the c) After 15-20 days of cultivation, the purse seine can be removed after the specification of young shrimp reaches 2.0cm, and the young shrimp can climb into the rice field by themselves and transfer to the rice field of adult shrimp for breeding. The distribution of daily feeding amount is as follows: 20% in the morning, 20% in the afternoon and 60% in the evening; or 20% in the morning, 20% in the afternoon, 30% in the evening and 30% at midnight.

b) Pond Patrol: patrol the pond in the morning and evening to observe the changes of water quality. During the cultivation of young shrimp, the transparency of water body should be 30cm-40cm.The transparency of water body is regulated by adding new water or applying fertilizer.

3.2.5. Adult Shrimp Culture Management

a) Feeding: water and grass should be fed once a month before December, with the dosage of 150 kg/mu; Apply one-time rotten farmyard fertilizer at the dosage of 100kg/mu-150 kg/mu. Animal feed or special artificial compound feed for Procambarus clarkii (crude protein content 30%-32%) should be fed once a week at the shallow water of the platform beside the ridge. The feeding amount is generally 2% ~ 5% of the total weight of shrimp. The specific feeding amount

should be adjusted according to the climate and shrimp intake. When the water temperature is lower than 12 ℃, feeding is not required. In March of the next year, when the water temperature rises above 16 ℃, water and grass shall be added twice a month, with the dosage of 100 kg/mu - 150kg/mu. Feed animal feed once a week, with the dosage of 0.5 kg/mu-1.0 kg/mu. Artificial feed should also be fed once a day in the evening, with the feeding amount of 1% -4% of the weight of shrimp stored in the rice field, so as to speed up the growth of Procambarus clarkii. The available feeds include special artificial compound feed for Procambarus clarkii (crude protein content 28%-30%), cake meal, bran, rice bran, soybean residue, etc. the feed should meet the requirements of GB13078 and NY5072.

b) Regular patrol and regulation of water depth: from November to December, keep the field water depth of 30cm -50cm, and gradually deepen the water level to 40cm -60cm with the decrease of temperature. When the water temperature rose in March of the second year, the water temperature was controlled by adjusting the water depth to make the water temperature more suitable for the growth of Procambarus clarkii. The regulation method is: when there is sunshine on a sunny day, the water can be shallower and let the sun dry the water so that the water temperature can rise as soon as possible; in rainy days or cold weather, the water should be deeper to avoid the drop of water temperature.

3.3. Shrimp Breeding Mode

At the end of August every year, the parent shrimp is put into the circular ditch and field ditch of the paddy field 15 days before the harvest of mid season rice, with 20kg-30kg per mu. Put in the parent shrimp breeding mode, and develop commercial shrimp through three stages: parent shrimp breeding, young shrimp breeding and adult shrimp breeding.

3.3.1. Choice of Parent Shrimp

The sex characteristics of female and male shrimp, and the sex characteristics of sexually mature male and female shrimp are as follows. The criteria for selecting parent shrimp are as follows:

a) The color is dark red or crimson, shiny, and the body surface is smooth without attachments;

b) The individual is large, the weight of male and female individuals should be more than 35g, and the male individual should be greater than the female individual;

c) Female and male parent shrimp should have complete appendages, no damage, no disease, strong physique and strong activity ability.

3.3.2. Parent Shrimp Feeding

Source of parent shrimp: parent shrimp are selected from improved breeding farms and natural waters above the provincial level. Male and female parents cannot come from the same group and follow the principle of nearby purchase.

Transportation of parent shrimp: the selected parent shrimp shall be packed in plastic shrimp baskets of different colors according to male and female. A layer of water grass shall be placed on each basket to keep it moist and avoid direct sunlight. The transportation time shall not exceed 10h (hours). The shorter the transportation time, the better.

Before feeding parent shrimp, floating plants with an area of 40% - 60% should be transplanted into the annular ditch and field ditch. Feeding of parent shrimp: the parent shrimp is fed according to the ratio of female to male of 2-3: L. when feeding, immerse the shrimp basket in water for 2-3 times, each time for lmin-2min (minutes), and then put it in the annular ditch and field ditch.

3.4. Rice Cultivation and Management

Only one season rice is planted in shrimp paddy field. Rice varieties should choose tight panicle varieties with small leaf opening angle, disease and insect resistance, lodging resistance and strong fertilizer resistance.

The method of enclosing ridges is adopted for rice field consolidation, that is, a soil ridge with a height of 30cm and a width of 20cm is enclosed on the field surface close to the shrimp ditch to separate the ring ditch from the field surface. The whole field time is required to be as short as possible to prevent unnecessary losses caused by excessive density of small lobsters in the ditch for a long time. No tillage seedling throwing method can also be adopted.

In the paddy field where shrimp are raised, 200-300kg of farm manure and 10-15kg of urea can be applied per mu 10-15 days before seedling transplanting, which can be evenly scattered on the field surface and ploughed and raked by machine.

In the middle of June, the method of transplanting shrimps should be combined with shallow planting in the paddy field, and the method of transplanting shrimps should be delayed in the middle of June. Whether the seedling throwing method or conventional seedling planting method is adopted, we should give full play to the advantages of wide row sparse planting and slope technology, and the transplantation density should be 30cm×15cm is appropriate to ensure the good ventilation of crayfish living environment.

In January, the water level of paddy field was controlled at about 30cm; After mid April, the water level of paddy field should be gradually increased to 50-60cm;After transplanting seedlings in June, it is necessary to turn green with thin water, tiller in shallow water and dry the field with enough seedlings in the early stage; Moist management after drying and rehydration, and maintain a certain water layer at booting stage; After heading, dry and wet alternate management shall be adopted, and in case of high temperature, it shall be irrigated into deep water for temperature regulation; Water is cut off one week before harvest. From October to November before the overwintering period, the water level of rice field is controlled at about 30cm, so that the rice stump is about 10cm above the water surface; During overwintering, the water level shall be controlled at 40-50cm.

4. Conclusion

The output value per mu is about 6000 yuan, of which the output of rice per 667 m^2 is 400kg, 3 yuan per kilogram, and the output of crayfish is 120 kg per 667 m^2 with an average price of 40 yuan per kilogram. The company has promoted the employment of 5 low-income farmers in the surrounding areas, and the temporary employment of farmers has accumulated more than 500 working hours, which has good social benefits.

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