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Discussion on High-yield Cultivation and Assembling and Supporting Technology of Selenium-enriched Rice and Rapeseed Rotation in Taoyuan County

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ABSTRACT

Taoyuan County is a large grain and rapeseed production county. Taking advantage of the resource advantage of soil rich in selenium in Taoyuan County, it promotes high-yield cultivation and assembly technology of selenium-rich rice and rapeseed rotation in one-season rice area, optimizing the aggregate structure of the soil, improving the soil ecology and reducing the content of heavy metals in the soil, laying the foundation for the continuous increase in agricultural efficiency and farmers' income. Through rice and rapeseed rotation, the overwintering base of rice field borers are reduced, and the incidence of pests and diseases in the coming year is effectively reduced. The popularization of assembling and supporting technologies for rice-rapeseed rotation cropping and the promotion of high-quality varieties and planting techniques can increase the farmers' income significantly. This paper will describe the methods and technologies in detail from three aspects: the assembling and supporting methods of selenium-enriched rice and rapeseed rotation high-yield cultivation, main points of the supporting technology for the rice selenium-enriched cultivation and main points of supporting technology for the rapeseed selenium-enriched cultivation.

1. Assembling and Supporting Methods

1.1 Reasonable selection and matching of varieties

The crops should be arranged according to the different principles of riceoil'snutrient requirements. By selecting suitable crops of high-quality rice and double-low rapeseed varieties, rationally matching according to the growth period, making full use of temperature and light resources, supporting technology of rice rapeseed rotation cultivation with high efficiency can realize rice yields of more than 600kg per mu, rapeseed yields of more than 150kg per mu (=0.0667 hectares), and the total economic benefits of more than 1,000-2,000 yuan per mu.

Rice variety selection: High-quality, high-yield, stable-yield and resistant mid-maturing varieties (or mid-late varieties) are selected according to local conditions.

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Varieties that have passed the certification and have good rice quality, high and stable yield, suitable growth period, and strong resistance to diseases and insects should be selected, such as: Yueliangyou 2646, Hezhongxiang No. 2, Kexiang No. 2, Jingliangyou 1377, Longjingyou 1195, Jingliangyou 5438, Gongxiangyoulongsi.

Rapeseed variety selection: Double-low rapeseed varieties with strong lodging resistance, antibacterial nuclear disease, high yield and high oil yield are selected, such as, Jingyou 99, Xiangza You 631, Xiangza You 518, Sunshine 2009, Huayouza 62, and coated seeds to achieve effective prevention and control of pieris rapae, aphids and diseases in the early stage of seedling.

1.2 Fertilizer formulation on demand

The strategy of using organic fertilizers instead of some chemical fertilizers, and the fertilization principles of reducing nitrogen, controlling phosphorus, stabilizing potassium and replenishing micro-fertilizers should be adhered to. Organic nitrogen should account for more than 50% of the total nitrogen application. Organic fertilizers can be green manure, straw, marsh manure, cake fertilizer, livestock and poultry manure and commercial organic fertilizer. The fertilization ratio of nitrogen fertilizer, phosphate fertilizer and potassium fertilizer for rice is 2:1:3, and attention should be paid to the application of micro-fertilizer on the leaf surface. Rapeseed fertilization should be based on the principles of sufficient base fertilizer, early seedling fertilizer, stable moss fertilizer, and appropriate flower fertilizer, and scientific fertilization. Fertilizers should comply with NY/T394-2000 regulations, and the use of chemical fertilizers, biological fertilizers, organic fertilizers and mineral fertilizers that have not been registered by the national or provincial agricultural department is prohibited.

1.3 Appropriate mixing of pesticides

Pesticides in appropriate amounts should be used at the right time, and green technology of prevention and control of plant diseases and insect pests should be adopted, such as agricultural prevention and control, biological control, and physical and chemical trapping. The use of chemical pesticides should be in accordance with NY/T393, to control the use of chemical pesticides and the safety interval, and it should pay attention to reasonable mixing, rotation and alternate use of pesticides to overcome or delay the emergence and development of the drug resistance of pests and diseases. Chemical pesticides should be implemented adhering to the accurate requirements for the standards, selections, periods, amount and methods.

1.4 Scientific water transfer method

Water controlling irrigation. Generally, the irrigation depth is about 2cm each time, and the time for the rice field exposed should be increased as much as possible. The field should not crack in other periods except the sun-dried period.

Lightly sun light several times in advance. When the number of seedlings in the field reaches about 80% of the planned ear number, the field will be dried. When the rice field edge is slightly cracked, and the middle of the field is not sunk for feet, the field will be irrigated with a small amount water, maintaining the crack not widened and the soil not soften, with repeated times dried. Moist irrigation will be conducted when the young ear differentiation period begins, and water retention is the main thing from inverting 2 leaf tip stage to heading and flowering, and the moisturization is the main during the rice filling period.

Deep water temperature adjustment. In the case of high temperature during the rice filling period, the temperature can be adjusted by irrigating deep water of more than 10cm.

Generally, the water is cut off 7 days before harvest to ensure the soil moisture of the mechanized harvest of rice and the whole seedlings of rape.

2. Main Points of the Supporting Technology for the Selenium-enriched Cultivation of One Season Rice

2.1 Seed treatment and seed quantity

The rice seeds are sterilized and soaked, and the germination is accelerated until the breasts are broken, and the seeds are treated with 15% paclobutrazol wettable powder before sowing. The seeds are pretreated according to the standard of one catty (0.5 kg) of seeds, one gram of paclobutrazol, one (50 g) clear water, stack for one hour, (floppy disk seedling rice should not be treated with paclobutrazol).

The seeding amount per mu for direct seeding of hybrid species in field is 1.5 kg, and that for transplanting or floppy disk seeding is 1.0 kg.

2.2 Field improvement

After a certain amount of basefertilizer is applied, a rotary tiller is used to rotatably harrow the field, generally twice. The spreading rice field shall be divided into compartments, the width of which is about 3m, and the depth about 25-30cm. A “tic-tac-toe”-shaped waist ditch should be opened for the larger sowing field, and a “cross” waist ditch should be opened for the smaller field, and the waist

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ditches are 35-40cm deep. Ditches around the field are opened with a depth of 30-35cm.

2.3 Reasonable dense planting

Seedling and plot transplanting densities are as follows: hybrid rice 23.3×26.6 cm or 30.0×20.0 cm, two grains per stump, to ensure that the effective panicle number per mu paddy field is 200,000-220,000.

2.4 Fertilizer and water management

In rotary tillage, 80 kg of selenium-enriched bio-organic compound fertilizer is applied as base fertilizer per mu of field.

In the rice seedling stage (2-3 leaf stage), 2.5-3 kg of urea is sprayed per mu to extract seedlings.

In the rice seedling stage (4-5 leaf stage), microfertilizer is applied on the leaves. The selenium-enriched foliar fertilizer 1g + plant tonic 40g + brown sugar 75g + urea 50g are made into a 15 kg aqueous solution, which is sprayed 15 kg per mu. And spray 6-7.5 kg of urea per mu to promote tillering.

At the end of tillering of rice, after drying the field and re-watering, strong fertilizers are applied according to the color of the seedlings.

At the beginning of rice heading, micro-fertilizer is applied on the leaves. Selenium-enriched foliar fertilizer 1g + plant strengthening agent 40g + brown sugar 75g + urea 50g + salt 40g + 20% benzyl prochloraz 15g (5% difenoconazole + 15% prochloraz, a kind of high efficiency, broad spectrum and low toxicity fungicide with multiple effects on various diseases) is formulated into a 15 kg aqueous solution, which is sprayed with 30 kg per mu.

At the early stage of rice filling, the 15 kg of aqueous solution made of 1g of selenium-enriched foliar fertilizer, 40g of plant strengthening agent, 40g potassium dihydrogen phosphate and 40g of salt and 20% of benzyl ▪ prochloraz is sprayed 30 kg per mu. Strong growth of grass seedlings in the early stage (no wind-growing seedlings), stable growth in the mid-term and no premature senescence in the late stage will be ensured through scientific fertilization. The leaves will be green, and seeds will be yellow with good color fading, achieving the goal of stable and high yield.

2.5 Disease and pest control

The comprehensive measures such as physical and chemical trapping and biochemical control are adopted to prevent and control diseases and insect pests, with prevention as the main, treatment as a supplement, and a combination of prevention and control. High-efficiency, low-toxicity, and low-residue pesticides are choosed, without the use of high-toxicity, high-residue pesticides and other banned pesticides. Attention should be paid to the prevention and control of three insects and four diseases (three insects: rice leaf roller, second and third generation stem borer and rice planthopper) (four diseases: sheath blight, rice blast, bacterial blight and rice smut).

2.6 Field plowing and improvement

After harvesting, the "three ditches" (circle ditch, waist ditch and box ditch) and ridges should be opened in time ready for rapeseed transplanting (direct seeding).

3. Main Points of Supporting Technology for the Rapeseed Selenium-enriched Cultivation

3.1 Enough preparation of seedbed

0.12 mu seedbeds are needed one mu of rapeseed transplanting field, and 1.5-2kg of selenium-enriched organic compound fertilizers will be applied for deep soil preparation.

3.2 Timely sowing

The direct seeding time is September 15th to 20th, 200g per acre of field will be used for direct seeding, with thin and even sowing.

The seedlings will be transplanted from August 28th to September 8th, 30g of field seeds will be transplanted per mu. Thin and even sowing should be insisted. After sowing, dilute manure water is spread to cover the fire soil ash, and no seeds will be seen.

3.3 Seedbed management

The germination of seeds after sowing should be paid attention to, and the seedbed moist should be kept for the seedlings emergence.

Aphids, cabbage caterpillars, jumping beetles and ape leaf insects should be controlled, and damping-off in rainy days should be prevented.

Weeds should be removed, thinning seedlings should be well grasped, with seedlings retained, and about 50 strong seedlings should evenly be reserved per square meter.

Selenium should be supplemented to control seedlings. When the rapeseed seedlings grow to 5-6 leaves, each back tube water (15kg) + paclobutrazol 1g (to prevent high-footed seedlings) + selenium-enriched foliar fertilizer 1g (to supplement selenium) + plant strengthening agent 1g (to promote photosynthesis) + pesticides.

Application method: the agent should be spayed when

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it is cloudy or sunny and there is no water droplets on the leaf surface. It will take snowflake form to spray covering the top once, and can not be repeated to avoid the injury caused by the strengthening agent.

3.4 Enough preparation of pressed fertilizer

Enough fire soil ash 200 kg needs to be prepared for per mu rapeseed field, which will be planted thinly. Selenium-enriched bio-organic compound fertilizer 10kg, urea 3kg, boron fertilizer 1.5kg, mixing into human and animal manure fertilizer 3-4 dans, are piled and covered with agricultural film or straw. 3-5 days after transplanting thin plants, 200g stump fertilizer is applied per plant.

3.5 Field management

Topdressing and seedling promotion: 5-7 kg of urea is applied per mu 5day to 7days after transplanting. It should be applied when it is rainy. Human and animal manure fertilizers will be added or mixed. Urea should not be applied close to the roots to prevent roots burning, leaves damaging and seedlings death.

Inter-tillage weeding: Closed chemical weeding should be applied once within 2-3 days in direct seeding field, and it is required that the field is sprayed once and evenly, and it must not be too late to affect the emergence of rapeseed. In transplanting field, cultivating and weeding will be conducted once ten days.

Clear ditch and drain: In the spring of the following year, when it is rainy and prolonged, the three ditches should be dredged to prevent waterlogging.

Clever application of winter fertilizers: Before and after the winter solstice (December 18th-25th), according to the seedling sentiment and leaf color, the strong moss fertilizer should be applied. The first kind of seedlings has dark green leaves and 7.5-10kg of selenium-enriched biological organic compound fertilizer should are sprayed per mu. The second kind of seedlings have green and yellowish leaves, mainly green, and 12.5kg of selenium-enriched biological organic fertilizer and 5kg of urea are sprayed per mu. The third kind of seedlings have yellow and greenish leaves, mainly yellow, 15kg of selenium-enriched bio-organic compound fertilizer and 7.5kg of urea are sprayed per mu. After January 1st of the following year, regardless of whether the rapeseeds are growing well or not, top dressing is prohibited to prevent the rapeseeds returning to bloom in the later period, which may cause a reduction in production.

Three times appropriate fertilization:

The first is when the rapeseed seedlings grow to 5-6 leaves, each knapsack sprayer (15 kg) will be added 1g of paclobutrazol (to prevent tall seedlings) + 1g of selenium-enriched foliar fertilizer (to supplement selenium) + insecticide.

The second is moss stage (late December to mid-January) when the rapeseed seedlings are 35-40cm high and show flower buds. Each knapsack sprayer (15kg) + 1g of plant strengthening agent + lg of selenium-enriched foliar fertilizer (to supplement selenium) + 1000-2000 times of 80% Ethylicin E. C + 40g of salt (to prevent and cure rapeseed sclerotia) are compounded into 15kg solution to be sprayed 30kg per mu.

The third time is from rapeseed bloom, early March of the following year. The spraying should be choosed when it is cloudy or sunny, with no water droplet on the rapeseed leaves and no strong wind. The type, dosage and dosage of the third application are the same as those of the second application. In order to increase the selenium content or prevent serious sclerotium disease, it is better to spray it with a drone in mid-April.

3.6 Timely harvest

If rapeseed is harvested too early, it will affect the rapeseed yield and oil yield and reduce income. Harvesting is too late, increasing the difficulty of harvesting, causing a large amount of grain loss and reducing the harvest. During the silique ripening period, a harvester is used to harvest in a timely manner to ensure that the harvest is completed in mid-May without affecting the production of one season of rice.

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