

Application and prospect of lightened and simplified cultivation (LSC) in winter rapeseed production

XING Jun, LIU Lei

Anhui Agricultural Technology Extension Station, Hefei, 230001, China Email: ahll-2004@163.com

Abstract

The lightened and simplified cultivation (LSC), taking direct seeding as the core, simplified the management process and lightened the laboring intensity, which met the demand of labor force shifting from the rural areas. By adopting LSC technique in rapeseed production, the production cost reduced and the grower's profit enhanced. A summary of research result since the technique was employed in 2004, and five rapeseed cultivation patterns were presented, such as sowing without tillage but furrow dug by machine in paddy-rice field. The necessity and feasibility of promoting the technique was analyzed and rapeseed development program and countermeasure in Anhui province in future was proposed. Under the current situation of rapeseed market slumping, the growing area and benefit declining down, the technique would be vital significance to stabilize rapeseed production and increase farmer's benefits.

Key words: rapeseed, lightened and simplified cultivation, prospect

The rapeseed is one of the Anhui Province's main crops, the planting area is about 1.0 million hectares and total yield is above 1.5 million tons. In recent years, along with the shifting of the rural labor force and the rapidly expanding of single-season rice area, the light and simple rapeseed culture technique obtains development fast. According to statistical material, the area using no-tillage hole sowing technology and no-tillage broadcast sowing with machine pigging ditch technology full mechanization technology had reached 0.43 million hectares, which takes nearly half of the rapeseed planting areas.

Present application of light and simple culture technique

The rapeseed light and simple cultivation is a whole set technology system which has developed on rapeseed no-tillage technology. The light and simple culture technique takes direct seeding technology as core, "simple" means simplifying the complex cultivation management process of grown seedling and transplant, and "light" means reducing labor intensity. It receives farmers' welcome because it's less costs and higher benefits. Along with the changes of traditional rice planting system, the light and simple cultural technique has solved the contradictory about seeding rapeseed's season and crop for rotation. The main pattern of light simple cultivation.

Firstly, the rapeseed no-tillage transplants. It means that the soil dose not pass through plows before the seeds sowing or transplanting after front stubble crops harvest. The rapeseed no-tillage cultivates in Anhui province begins in 1970's, and has been developed in the middle of 1980's. This method is meanly applied in the south of Huai River where has a few labors and the crops rotation is tense. It can save the time of ploughs, even ahead of transplants time, It can also take full of the sunshine before winter, reducing the effect of bad weather.

Secondly, the rapeseed no-tillage sowing: The rapeseed no-tillage seeds sowing is nearly the same with no-tillage transplants on procedure, it is also a technology evading natural disasters, which is been used in the broad area especially with less labors. This kind of planting way is quite simple, often many seedlings are crowded in one hole, so it affects the yield because of ontogenesis growth difference.

Third, the rapeseed grown and developed in autumn and low density culture: This method is to reduce transplant density, use fertilizer scientifically and display individual growth superiority through early sowing, early transplanting and early management. The seedlings are planted 37,500-90,000 each hectare in general. It saves the cost and working time through reducing transplant density. This method is widely taken in Anhui province, which requests higher management level.

Fourth, The rapeseed no-tillage and broadcast machine with the complete set of digging ditch technology: In order to explore the rapeseed directly seeding high production growing technology, the agriculture department in Guangde county has formed the from cultivating and broadcast machine digging the ditch and growing technology which is based on the traditional directly broadcast technology and turned to research and upgrades the covering soil machine after several years' practice. When the former stubble is harvested, the peasants fertilize and broadcast the seeds directly on the paddy stubble in the suitable soil planting period. Then dig ditches and cover soil with the digging machine, and sprinkle the soil on the embanked field. It can not only save the labors but also advanced the broadcast period compared with the transplanting rapeseed. This cost of every 667m² will save one livestock and more than three labors. The production or less with the transplanting rapeseed in the usual year's harvest and it can fight natural calamities and increase the production. This will increase revenue and reduce expenditure about 70 yuan. The key technology includes basic fertilizer much more and broadcast after rice harvesting at the

end of December and beginning of October, the amount of seeds is about 2.25—3.0 kg/ha is broadcasted; the chemical weeding technology is used; the machine digging ditches in the suitable soil planting period; broadcasting and covering soil on the seeds and so on. It is characterized of reducing the production links, saving the labors with the free from direct broadcasting. Through digging ditches and covering soil it can prevent from waterlogging disaster and lessen the disease. The production and benefit have been improved. The technology has been applied by 80 percent of the rapeseed in Guangde county. The model required the relative high quality soil so on so as to dig ditches and throw the soil.

Finally, the rapeseed whole process mechanization with the complete set of technology. The rapeseed production whole mechanization includes the two links of seeding and harvesting. It is useful for lessening the labor intensity, improving the production efficiency realizing the straw to return the field, accelerating the regional standardization planting of rapeseed. The keys of technology include firstly choose the proper seeds for the machine broadcasting and harvesting. It is usually to choose the seed of high production, strong resistance, the high position of branch, the small angle of branch, well germinating in spring, concentrated florescence suitable for harvest. For example, Qinyou No 7, Wanyou No 24, Chu heza No 1, Tianhuyou No 2 and so on are well suitable for mechanization planting. Secondly broadcast sowing in right period. The broadcast sowing time is between the 25th September and on the 5th October in JiangHua area. It promotes to broadcast in advance in order to increase the yield. Thirdly seed in science. Harvest the rice to seed. If the condition is not enough, the condition will be made by irrigated fast water. The seeding amount is 2.25-3.0 kg/ha. Fertilizer and N-P-K compound fertilizer for the use of rapeseed will be mixed well distributed. The machine seeds properly. The distance between rows is forty centimeters. The distance with big or small rows, the big 50 centimeters, the small thirty centimeters.

In order to remain soil moisture and reduce the cost of production, no-tillage machine drill sowing can be applied. The sowing machine can be used for 2BG-6A rice-wheat drilling machine reshaped. The fourth is to harvest on time. The rapeseed can be harvested by the reapers when they are mature to 90%. The straw can be crushed back to soil at any time.

The soil belongs to the clay soil and the arable period is short in jiang-huai area. Meantime, it lies in the transitional region of the northern and southern climate and climatic disaster happens frequently, about three times every five years. It is either floods or droughts. All of these factors usually influence the timely cowing of reaps and the formation of young plant. It is a big restricting factor for the production of the technology of reap drilling can be arranged after the harvest rice (from the end of September to the begging of October), and no-tillage machine drilling or minimum tillage machine, is of great significance to stabilize the production of reaps in this region. It also represent the developing direction of the technology of rapeseed light and simple culture.

The necessity and feasibility to accelerate and widen the light and simple technique in rapeseed

There are many processes about the planting and managing of rapeseed. Which requires a lot of work and time. During recent two years, the effectiveness of the oil processing industries have declined and the planting area of rapeseed has reduced because of the increase of import of soybean and oil, of the price of manufacturing materials such as chemical fertilizer and the reduce of product caused by disasters. Thus, it is very important to give full realization to these problems, to develop the planting technique of lightness and simplicity of rapeseed to accelerate its application, and to reduce the expenditure, and simplicity of rapeseed, to accelerate its application, and to reduce the expenditure. The main problems related to the producing of rapeseed are below.

To begin with, Relatively lower price in 2005, the price of rapeseed of market is from 2.3 Yuan to 2.4 yuan per kg, while the price of wheat is ranging from 1.3 yuan to 2.4 yuan per kg. Farmers' activeness will be mobilized and the planting area of rapeseed can be fixed, if the government enact the policy to protect the price of rapeseed by making the price of rapeseed stable and the ratio between rapeseed and wheat is 2:1.

Next, the labor cost is higher. Cultivated transplanted rapeseed on every hectare is needed 172.5 labors. Every labor needs to pay for 30 Yuan every day, the cost of the labor will be 5100 Yuan per hectare. The cost is too high. Most young labors go out to work for the boss from the countryside. Cultivating and translating season is too long. It is not worth for young labors to return to plant rapeseed. It gradually resulted in extensive planting technology and even cause the area fluctuation.

Furthermore, the high price of production materials such as chemical fertilizer and it's high price increase the rapeseed production cost. According to the survey in Anhui province soil and manure station that the cost of fertilizer continue to rise except the urea and carbonate ammonium in 2005. The rice of rise except compound fertilizer is 2262 Yuan every ton. It rises 6.17% and 36.76% compared with the year of 2004 and 2003. The price of national phosphate bi ammonium is 2469 every ton, going up respectively 3.26% and 40.28% than the year of 2004 and 2003. The price of national potassium chloride 1930 Yuan every ton, which goes up 26.82% than the year of 2003. The over consumption of production high price not only increase the rapeseed production cost burt also break the initiative of the peasants.

In addition, the impact of importation was another reason. In 2005, from Jan to Sep. China imported soybean 195 million tons, increased by 40% comparing with the counterpart period of last year from Jan to Aug the vegetable oil 44.9 million tons, raised by 43.4%; contrasting with the same period of last year. All of these have brought great effect to the domestic oil-fatness process industry and plantation of oil plant.

Finally, the low productivity and poor efficiency are important influence factor. The average productivity of rapeseed oil has been about 110 kilogram for several years. The low productivity and poor efficiency affect the farmer activities directly. What is more, for several years, the government has taken actions to compensate for the food crops, such as wheat and so on, which improved the activities of planting wheat for farmers. Therefore, in some degree, this policy has influenced the area of rapeseed oil plantation.

In the view of the analysis above, it is evitable and feasible to change the model of traditional plant patterns, expand the machine using in sow seeding and harvest time, make manage appropriate cultivation simply and the production of rapeseed stable and reduce the expenditure and improve efficiency.

First, the enlargement of the area under one season rice, solve the contradiction between the direct sowing rape and crops for rotation. With the development of rural economy, the system of planting crops has change a lot. Take rice for example, from 1980 to now, the area of one season semilate rice has grown from 5.1 to 17.0 million hectares, while double seasons late rice has dropped from 9.3 to 2.9 million hectares. In the main production area, rapeseed is mainly cultivated crop after rice, the rapid enlargement of the rapeseed area under one season rice solve the contradiction between the direct sowing rape and crops for rotation, which ensure the rapeseed can be planted in good time; and then do good to the breeding of the seedling before winter keeping yield balance between sowing and the transplant seedling planting.

In the next place, success of research experiment provides technological support for the demonstration of light and simple culture technology. At present, with the rural labor shifting, continuously increasing of rape production cost and decreasing of benefits, the demonstration and popularization of rapeseed light and simple culture technology will have abroad prospects. In order to adapting to the changes of rapeseed production, Anhui agricultural technology extension station has carried our lots of experiments encircling light and simple culture technology in rapeseed. We have experimented with culture procedures without plowing, sowing date, sowing quantity, stem covering, weeding, fertilizing, plant management and some assembly. What is more, some places have developed ditcher without plow, seeding machine, harvesting machine which form a integral technological system. All of these have held up the demonstration and popularization of the technology.

Thirdly, the rapeseed light and simple culture technology can suit the need of shifting the surplus labor force in the rural area from farming to other sectors. Transplanting rapeseed technology demands to cost a lot of labors, time and great labor intensity. With more and more prime labor force living and working outside, the majority left behind are those who are either too old or weak, sick to go outside or disable people and women. These people can not produce good-qualified rapeseed with high efficiency, therefore, there is a urgent need of developing a light and simple culture technology which can at the same time improve the quality of production in rapeseed. Luckily, the newly developed technology can answer this call exactly.

The developing idea

During the eleventh Five-year plan and in 2006, the rapeseed production in our province should insist on these ideas of ensuring certain scale of area for rapeseed production, raising the per unit area yield, improving the quality and efficiency, cutting down the cost, establishing our own brand name, utilizing comprehensively.

In terms of rapeseed production, the planting area should be kept around 1.0 million hectares. The hectare yield should raise from present 1725 kg/ha to 1950 kg/ha, in some area even over 2250 kg/ha; the area of double lower and high quality rapeseed reach about 90%. Though centralized combined the field, scale planting, the main production area regarded city and county as unit to realize whole double low rapeseed. There are four suggestions provided as a reference to Anhui province rapeseed development.

The countermeasure and suggestion for developing rapeseed production

To start with, take advantage of some programs' promotion role. Taking and using the experience of the agriculture department that has carried out the technology innovation and demonstration with the high efficiency and good quality rapeseed and popularized the typical program, in some main production area, perform the great spreading projection based on the light and simple technology as its content. Then take is as a tool to prompt the local and department's working enthusiasm and to balance and promote the rapeseed production development.

Then, enlarge the range of subsidy of using good breeds. Since the year of 2003, Anhui province has begun to supply special funds (60 Yuan per hectare) for the seven counties, a total area of 66,667 hectares, such as Huoqiu, Wangjiang, Quangjiao, Feidong, Juchao, Hanshan and Langxi county. To supply free seeds for farmers and 7.5 yuan per hectare as subsidies to develop experiment work of using good breeds. By taking this measure, good situations appear. On one hand, the rapeseed planting come into a large scale, the unity of seeds are improved, the market price is balanced and farmers' interest is gotten, which is warmly welcomed by farmers. For another, the agriculture department popularize this technology to some needed area where farmers are able to harvest more productions, and the fiscal department are very satisfied. Both sides gain benefits in order to benefit more farmers and departments; the expanding good breeds subsidy program should be promoted continuously.

Besides, carry out research and exemplification of light and simple techniques, and do technological integration well. The production of rapeseed of Anhui providence covers three major areas, categories are complicated, kinds are various, and system of planting, soil category and planting customs have their own characteristics. At the same time, light and simple culture have many models. Therefore, research and experiment of light and simple culture must be carried out, and integrating the technological systems of light and simple culture must be craned out, and meet local needs and satisfy requirements of productive development.

Last but not least, choose good cultivar that is fit for mechanized planting. The mechanization of the whole process of rapeseed, saving labor, time with high quality and high profit, represent the development direction of light and simple culture technology of rapeseed in the future. The mechanization of the whole process of rapeseed needs the breed of high yield, good quality and disease resistance as well as a variety of special requirements, such as the first branch height more than 50 cm, and the height no more than 160 cm, the plant model is close, and the angle between branch and stem is small, the period of

blossoming centralized, the mature degree of pods relatively identical, pods not easy split and the stem strong and resisting lodge, resistant weedicide and so on. The breed department has already bringing up such varieties and listed them as the breed keystone in the future. Regional and extension centers of agricultural technology should combine local reality and bring in and choose right varieties to satisfy the needs of the mechanized planting in rapeseed.