Farmers' State of Mind and the Policy Thinking for the Cotton Production in Shandong Province

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Abstract Affected by the meteorological disasters and market fluctuations, the growing area, yield and quality of cotton in Shandong Province have been reduced to varying degrees in recent years. The majority of farmers are regarded as the main body of agricultural production, whose enthusiasm for growing cotton and confidence in the cotton market play a significant role in stabilizing the growing area and improving the quality of cotton. We randomly select the cotton farmers for in - depth interview, to understand the situation of cotton cultivation and their state of mind for growing, aimed at deriving the factors influencing farmers' willingness to grow cotton. In the future, it is necessary to make the best use of the advantages and bypass the disadvantages, and in a timely manner curb the decline of cotton cultivation in the process of guiding and encouraging the cotton cultivation, in order to solve the problems of low farmers' willingness to grow cotton and sluggish cotton industry from the root.

Key words Shandong Province, Cotton production, Farmers' state of mind, Policy thinking

1 Introduction

Shandong Province is a major producing and processing province of cotton, whose cotton cultivation area and cotton production both account for about 15% of the national level, second only to Xinjiang. However, in recent years, the cotton production in Shandong Province has been showing a downward trend. The growing area was 10.5 million mu, decreasing by 10% over the previous year.

Why are the farmers in Shandong Province not willing to grow more cotton? Why do some farmers still insist on growing cotton? In the period October - November, 2012, members of the research group went to the cotton growing areas in Binzhou and Dezhou in Shandong Province, to randomly interview some cotton farmers and have a certain understanding of farmers' state of mind for cotton cultivation (Table 1). Some of the information is of high policy reference value.

Table 1 The cotton cultivation situation of cotton farmers surveyed and their willingness to grow

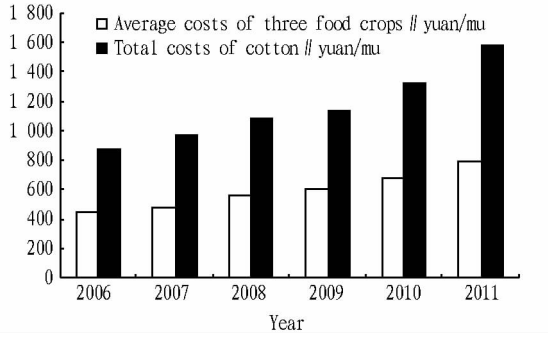
Serial number of farmers	The purchase price of seed cotton // yuan/kg		Cotton yield // kg/mu		Willingness to grow	
	Expected price	The actual purchase price	Average yield in the previous years	The expected yield in this year	The cotton cultivation area in this year	Whether to grow cotton in the coming year
1	9.20	8.00	250	150	7 mu	Yes
2	8.60 - 9.00	6.0	225	85	5 mu	Not
3	9.00 - 9.40	Unknown	240	90	4 mu	Yes
4	9.00	8.00 - 8.20	225	200	7 mu	Yes, but reducing the area
5	9.60	8.20	250	190	13 mu	Yes, but reducing the area

Data source: The survey of farmers' state of mind in Shandong Province (Research group, 2012).

2 Analysis of unfavorable factors influencing farmers' cotton cultivation in Shandong Province

Why are many cotton farmers in Shandong Province not willing to grow more cotton? Many unfavorable factors affect cotton farmers' enthusiasm for growing cotton in Shandong Province.

2.1 High cost of cotton cultivation The cotton production costs include the direct material costs of seed, fertilizer, mulch and pesticides, the fees of farming and irrigation, and direct cot-



Data source: 2012 Compilation of National Agricultural Costs and Returns Data.

Fig. 1 The histogram of comparison of cultivation costs between cotton and grain crops

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ton farmers' labor costs of farming, planting, pruning, pesticide spraying and harvesting. Affected by the general rise in the prices of agricultural materials, the material cost per mu for cotton cultivation in Shandong Province was 415.85 yuan in 2011, an increase of 10.51 % over the previous year. The total input costs per mu of land of cotton are 50% or so more than that of wheat, rice and corn (Fig. 1), and the increase rate of cotton is higher than that of food crops. The total costs of cotton cultivation increased by 19.16%, while the costs of food crop cultivation increased by 17.61% in 2011.

In terms of the direct labor costs, 20.29 labor forces per mu of land needed to be invested in cotton cultivation in 2011, 2.99 times than the labor inputs of three major food crops of rice, wheat and corn. This leads to surge in the labor costs for cotton production. The labor costs for cotton cultivation in Shandong Province in 2011 reached 979.14 yuan/mu, acco unting for more than half of the total costs of production. The excessive input costs and labor costs in the earlier period, lead to sharp drop in the net income of cotton cultivation, and the farmers lack enough incentives and confidence to engage in cotton production. The survey also shows that the increase in various costs reduces the net income for farmers, and it fails to make ends meet in the crop failure years (Table 2).

Table 1 The cost – benefit statistics of cotton cultivation by the farmers surveyed Unit: yuan/mu

Serial number of farmers	Yield per unit area kg/mu	Seed subsidies	Gross income	Seed	Fertilizer	Pesticide	Mulch	Irrigation	Leasing land	Mechanical farming	Labor employment	Net income
1	150	15	1215	160	200	100	20	90	0	30	160	500
2	75	0	600	160	150	150	25	40	0	30	0	−55
3	90	0	720	160	140	200	25	50	0	30	0	115
4	200	0	1600	160	180	100	25	0	0	30	180	925
5	190	15	1580	160	250	150	30	40	400	30	160	360

Note: The opportunity cost of the family labor is undiscounted. Gross income calculated at the purchase price of 8 yuan/kg

2.2 Decline in the comparative income of cotton cultivation

Cotton and grain are major agricultural products in the national economy and people's livelihood, there is a competition for land, fertilizers and labor forces between them. Based on the average seed cotton yield per mu of land at 200 kg (actually many areas can not reach this) and the average price of 9.2 yuan/kg, the yield value of cotton cultivation per mu of land is calculated at 1840 yuan. Deducting the direct cotton cultivation costs of 560 yuan/mu and plus seed subsidies of 15 yuan per mu of land, the cotton cultivation income per mu of land is 1295 yuan. The grain cultivation income is calculated based on producing one season wheat and one season corn. The average yield of wheat per mu of land is 530 kg, the average yield of corn per mu of land is 550 kg; the average price of wheat is 2.2 yuan/kg, the average price of corn is 2.3 yuan/kg, and the yield value of grain per mu of land is 2431 yuan. Deducting the direct wheat cultivation costs per mu of land of 420 yuan and the direct corn cultivation costs per mu of land of 360 yuan, plus the grain subsidies per mu of land of 120 yuan, the grain cultivation income is calculated at 1771 yuan. By comparing the cotton and grain cultivation, the cotton cultivation income per mu of land is 476 yuan less than the grain cultivation income per mu of land, in the case of labor costs not being calculated.

This widening income gap is the most important reason for farmers' abandonment of cotton cultivation. Because the contradiction of competing for land between grain and cotton is prominent, there has been the phenomenon of " pulling the cotton to grow wheat" in some places of Shandong Province. According to the statistics, the cotton cultivation area in Dezhou City is 1.3 million mu this year, a decrease of 20% over the previous year, only about 45% of the cotton area in 2008. The annual cotton cultivation area in Binzhou City is 2.5 million mu, but in 2012, it was just 2.2 million mu, a decrease of 12%.

2.3 Time – consuming cotton cultivation with great labor intensity The production cycle of cotton is long and there are many growing links. At the same time, the mechanization rate is low, and the labor costs are so high. The field management is complex, and the whole family will be busy more than six months from April to October at planting, field management, picking and pulling cotton stalk.

From the on – site research, the cotton picking in Binzhou City and Dezhou City is still totally dependent on traditional manual labor, and there is no mechanical operation. Grain cultivation has achieved full mechanization in planting and harvest. The harvest can be completed within a few hours, and the time saved can be spent on working outside the home. The monthly income can be up to 1000 – 2000 yuan, far greater than the cotton cultivation income.

Therefore, in the survey, we found that young people are increasingly unwilling to grow cotton, and the women and the elderly are mainly responsible for the picking of cotton in the cotton fields. Due to high labor costs this year, the income of cotton farmers, especially the farmers with a large cotton cultivation area is dropped significantly, even at a loss. After the interview, the research group learned that there was the phenomenon of nobody harvesting the ripe cotton in some regions of Binzhou City. This situation is also a serious blow to the farmers' self – confidence and enthusiasm on the cotton cultivation, and they then turn to the cultivation of other crops or working outside the home.

2.4 Weak national policy support to cotton cultivation

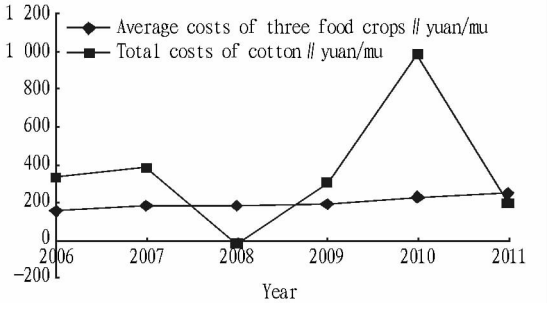
There are seed subsidies, grain growing subsidies and agricultural material subsidies to the cultivation of grain crops (about 98 yuan to per mu of land); there is only the seed subsidy of 15 yuan to cotton cultivation, and we found in the survey that some regions

have not given the subsidies to farmers for various reasons (only two rural household receiving the seed subsidies among five rural households interviewed).

In addition, the grain crops have stable minimum purchase price policy. The cotton is also related to people's livelihood as the staple crop, but the minimum purchase price policy of cotton has not yet been introduced, difficult to resist the impact of international cotton price on China's cotton market, so that the domestic cotton market is instable and fluctuating, severely dampening the farmers' enthusiasm for production.

2.5 Frequent fluctuations in the cotton price, and great market risks After the opening of the cotton market, the cotton price is affected by textiles export and cotton import, with great fluctuations. In 2004, cotton experienced a bumper harvest, but the cotton price plummeted, and the purchase price of seed cotton was less than 4 yuan/kg; in 2008, there was another bumper harvest of cotton, but the purchase price of seed cotton declined from 6.2 yuan/kg to 4.5 yuan/kg. The direct beneficiaries of purchasing and storage policy are the purchasing and storage enterprises but not farmers. The promulgation of purchasing and storage policies occurred around the harvest period of cotton, so when the seed cotton price was transmitted to farmers, the boom season for the sales of seed cotton was over. Therefore, it has little effect on propping up the market, stabilizing cotton prices and increasing cotton farmers' cultivation income, unable to effectively stabilize the cotton price fluctuations in the year.

Fig. 2 shows that from 2006 to 2011, the average net income of wheat, rice and corn was steadily rising, but the average net income of cotton experienced violent fluctuations. The frequent volatility is likely to panic farmers, making them abandon cotton cultivation.



Data source: 2012 Compilation of National Agricultural Costs and Returns Data.

Fig. 2 The line chart of net income of food crops and cotton

2.6 Greatly influenced by natural disasters Agricultural production is intertwined process of the natural reproduction and economic reproduction, so relative to industrial products, there are greater fluctuations in the agricultural products. The growth cycle of cotton is long, and the requirements of natural growth conditions are higher. In comparison with wheat, corn and other food crops, it is more vulnerable to natural disasters and pests and diseases, which may lead to production decline or even crop failure.

In Shandong Province that we survey, the significant reduction of cotton is affected by the bad weather disasters (typhoons), making some cotton farmers suffer large losses, and some losses are even more than 0.1 million yuan. In addition to imperfect disaster early warning mechanisms and agricultural insurance system, the vast majority of farmers surveyed can only bear the huge losses caused by disasters. These have greatly reduced the farmers' enthusiasm for cotton cultivation and their confidence in the cotton market.

3 Analysis of factors driving the farmers to grow cotton in Shandong Province

Facing these difficulties above, there are still some farmers insisting on growing cotton (only one rural household prepared to abandon cotton cultivation in the coming year among five rural households interviewed). Through intensive cultivation of the fields and scientific management, some farmers even obtain considerable gains in the disaster year.

Actively using this mentality to expand the number of cotton farmers, and improving the quality of cotton, is the guarantee for the sustainable development of cotton industry. Thus we analyze the factors driving the farmers to continue to grow cotton from economy, society, cultural traditions, geographical restrictions and other aspects.

3.1 Constraint of soil conditions Binzhou and Dezhou surveyed are the regions with serious soil salinization in Shandong Province. A large area of land is the saline and alkaline wasteland with crop failure before growing cotton, due to the constraint of soil conditions. Cotton has the natural characteristics of resistance to drought and tolerance for salt. On the saline and alkaline wasteland where the staple crops would not grow, developing the cotton cultivation can ease farmland tension.

Thus choosing to grow cotton on the saline and alkaline land is theoretically and economically feasible. Certain economic benefits can be obtained while avoiding the abandonment of land. According to statistics, on the slightly saline and alkaline land in Binzhou City and Dezhou City, the yield of food crops is only 30% −50% of the yield in the major producing areas, but the cotton yield per mu of land can reach 200 kg, which is about the average level of the province.

3.2 Constraint of farmers' family conditions Human resource is the most active factor in the production, for a family, its human resources are limited and scarce, so how to rationally allocate limited human resources, and maximize the economic benefits, is the inevitable choice for each farmer as "rational economic people". Because of different endowments between human resources, each household often chooses the well educated young people with strong ability to adapt to work outside the home, while the middle aged and old people (especially women) can not give up land to work outside the home, for the purpose of taking care of the elderly and children.

To keep land not idle, many women left behind in the regions surveyed choose to continue growing cotton while taking care of the

family. Due to the endowment restrictions of labor itself, the women and the elderly left continuing to grow cotton, with poor ability to adapt to the market, can not accurately analyze the cotton supply and demand trends. Coupled with the lack of intermediary organizations to link the farmers with market, they can not timely adjust planting structure based on market demand and price volatility, so even if the cotton industry is not rosy, they still choose to continue to grow cotton.

3.3 Impact of cultivation habits and herd mentality Changing crop planting structure need to pay the transfer costs, including the costs of learning new field management techniques, the transaction costs of gathering market information facing unknown risks, and the opportunity cost of losing existing benefits. From the current situation, the ongoing costs of cotton cultivation are small, but the transfer costs are large. In order to avoid huge earlier input changing into sunk cost, cotton farmers have obvious path dependence mentality, making the planting inertia continue. Shandong Province has a long history of cotton cultivation, many interviewed cotton farmers have more than 5 years of cotton cultivation experience and rich field management experience, familiar with the cotton planting industry, which makes the "cost of entry" for cotton cultivation small, so even in the case of this year's poor harvest, the majority of cotton farmers still continue to grow cotton, to a certain extent, affected by the growing inertia.

Herd mentality is a psychological behavior that people will be influenced by others around when make decisions under conditions of uncertainty, when their point of view is inconsistent with that of the community, people often considered mainstream view of adequate information or correct prediction ,so they give up their own views easily and follow the groups'.

In the survey, some cotton farmers said that they chose to grow cotton, because most other farmers in the village were growing cotton. This is obviously subject to herd mentality. To a certain extent, "following other people" can compensate farmers in terms of lack of information and judgment, but it also affects farmers' rational decisions.

3.4 Cotton can be harvested and sold at any time First, the biological characteristics of the cotton determine that the bolls at the top of plant will be first mature, the lower the part of plant is, the more late – ripening the part is, so the completion of cotton harvest in Shandong Province usually takes three to four times, from early September to November, ready to be harvested.

In addition, after being picked, the cotton can be timely purchased. After the reform of cotton circulation system, the cotton farmers' sales channels are increased, and "cotton dealers" in various regions swirl about the streets, and directly bargain with the farmers to settle in cash on the spot, in the fields or farmers' houses, without arrears. It has met the needs of farmers for money from time to time, to some extent, avoiding the market risk and liquidity risk, creating higher utility for farmers. In contrast, wheat and other crops need to be transported to the point of purchase after harvest of all crops, so the liquidity is not as good as cotton.

3.5 Constraint of plot conditions Some farmers' contracted land is too fragmented, and the land division is serious, difficult to implement the mechanical operation for sowing and harvest, therefore not suitable for growing wheat, corn and other crops. In the research object, there are a number of poles in a farmer's contracted land, likewise making the mechanized cultivation difficult to complete.

Although cotton cultivation is time – consuming and labor – intensive, its planting process relies on manual labor, so it is suitable for growing cotton on such discontinuous plots caused by people. To make the scattered land not desolate is also a factor that some farmers consider to choose cotton.

4 The support policy thinking on farmers' cotton cultivation in Shandong Province

4.1 Planning and guiding the orderly development of cotton cultivation in the saline and alkaline land The saline and alkaline land should become a key point for the future cotton cultivation area and yield breakthrough, and has the potential to become a booster for stabilizing cotton production, and easing the of competition for land between grain and cotton. Shandong Province has more than 8 million mu of saline and alkaline land suitable for cotton cultivation. Now there is about 5 million mu of saline and alkaline cotton field, accounting for about 45% of total cotton field area in the province, so the there is a great development space for cotton cultivation on the saline and alkaline land. Saline land reclamation is difficult, and there is a need to excavate irrigation and drainage channels, level the land, and erect electricity transmission lines. The large project costs much, in need of the policy and financial support of the state. However, the initially developed saline and alkaline cotton field is mostly reclaimed by the farmers themselves, lacking unified planning and financial support, and most of it is low – yielding cotton field.

Therefore, the secondary development of saline and alkaline land, and the supporting irrigation and drainage, electricity facilities are very helpful in increasing the production. In addition to the government support and guidance, the operation form of cooperatives or companies can be used to attract cotton farmers and cotton research institutions to achieve integration of development, production, processing and marketing.

4.2 Using the corresponding preferential policies introduced by the government to stabilize the cotton market Labor, fertilizers, seeds and pesticides constitute the major part of cost of cotton production. The state should adopt seed subsidies, direct agricultural material subsidies and other forms to offer production subsidies to farmers. The total subsidies to cotton cultivation should not be less than the total subsidies to grain cultivation. The state should allocate special funds each year, to establish high quality cotton base in the major producing areas of cotton, in order to achieve economies of scale, mechanization and specialization, minimize labor costs as far as possible.

Meanwhile, it is necessary to promulgate the "minimum purchase price" policy as soon as possible, to stabilize cotton market prices, and avoid market risks. For the shortcomings in the cotton purchasing and storage policy, it is necessary to implement the cotton purchasing and storage policies on the basis of timely and comprehensively releasing the market information, according to different sales processes characteristics of different cotton producing areas, in order to ensure cotton farmers' income in cotton cultivation.

4.3 Improving the natural disaster warning and agricultural insurance system In Shandong Province, the significant reduction of cotton in 2012 is affected by the bad weather disasters, making some cotton farmers suffer large losses, but the surveys show that the vast majority of farmers have not received the related pre-disaster early warning, and there is no corresponding agricultural compensation after disaster, which greatly reduces the farmers' enthusiasm and confidence for growing cotton.

First, it is necessary to achieve the overall early warning of natural disasters; strengthen the interlink and intercommunication among meteorological department, agricultural management department, civil affairs department and other systems; realize identification, estimation and evaluation of a variety of natural disaster risks, to effectively prevent, and mitigate the agricultural production losses arising from natural disasters.

Second, it is necessary to establish and improve the agricultural insurance system. Cotton production is related to people's livelihood, so there is a need to establish government subsidies-based policy agricultural insurance, supplemented by private agricultural cooperative security funds, to jointly reduce and spread agricultural natural risks, and protect the cotton cultivation income in the disaster years.

4.4 Improving the organization and industrialization of cotton production and acquisition The establishment of cotton farmers' cooperatives and the cotton industry associations can effectively organize scattered cotton farmers for unified production, thereby reducing the costs and improving the cotton quality consistency.

It is necessary to purchase good and cheap cotton varieties through a unified bidding, to minimize the cost of productive seeds; through unified timely sowing, unified fertilizer and water logistics, unified insect pest control and unified chemical control, strictly control and reduce the cost of field management and production; develop appropriate technical regulations to strengthen the supporting management of cultivation techniques, and implement technical guidance on field operation, to expand the amount of agricultural machinery operation, reduce farmers' labor intensity, improve labor productivity, and increase the overall efficiency of cotton cultivation.

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