

## COMPREHENSIVE DEVELOPMENT OF AGRICULTURE IN THE LOESS PLATEAU AREA

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**ABSTRACT:** The Loess Plateau is one of China's developing areas where socio-economy is backward, ecological environment deteriorated and people's life difficult.

The purpose of carrying out comprehensive development of the area's agriculture is, in essence, to open up new fields of agro-production, to intensify the utilization of related resources, to raise productivity and to win bigger output. The decision is important, as by so doing, the physical landscape could be transformed, the local economy could be flourished, and the people's standard of living could be improved, and moreover the national development strategy of "depending on the East and shifting to the West" and building Shanxi Province into an energy and chemical industrial base could be realized.

Based on field investigations in recent years, the author proposed the purpose, target, principles, steps, tactics and strategies for the comprehensive development of the area's agriculture.

**KEY WORDS:** development, management, economic law, ecological benefits, comprehensive development

The Loess Plateau, located in north China, with an area of about 630 thousand square kilometers, occupies nearly 6.5% of China's total territory.

The Plateau consists of 285 cities and counties of 7 provinces, having 7.7% of the Chinese total population, namely 82 millions. It is covered by loess about tens or hundreds meters in thickness, and 70-80% of the area are mountains. The plateau has a long history in development of agriculture. It was the cradle of Chinese nation and mainly an agricultural area.

For a variety of reasons such as natural, historical and etc., soil erosion here is the most serious problem in China. Particularly in recent years, while population growth is too

fast, land cultivation is too big, and for fuel need in the rural forestland and grassland were extensively destroyed. Meantime, This area is devoid of agricultural investment, and capital construction on cultivated land and irrigation works are in bad condition and cease to operate effectively. As a result, land utilization is improper, soil erosion is serious, and soil salinization is getting obvious. The water and soil erosion problem is the outstanding one in the area. The eroded area has already reached 530 thousand square kilometers. And the soil erode amount of more than 50% cities and counties has reached 5,000 t/ km<sup>2</sup>. Among them the north-western part of Shanxi Province, southern part of the Ningxia Hui Autonomous Region and eastern part of Gansu Province have even reached 20,000–30,000 t/ km<sup>2</sup>. Besides destroying land resource, the erosion brings about aridness, wind and dust, and consequently natural calamity happens more frequently. The environmental quality is getting worse. All these factors curtail greatly the development of agricultural production. The average grain output here was 146kg per mu (1mu = 1/ 15 ha) in 1986, much below the national average output of 235kg per mu. So the area yields scarcely enough grains for its population. For example, the total grain demand of the whole area was 31.5 billion kilograms in 1985, which fell short of 25%. Apart from the grain shortage, the annual income of the peasants in 1985 was below 350 RMB. 20% of the peasants, living in hills and gully as well as remote mountains, have not solved the food problem. The loess Plateau is one of the China's developing area where socio-economy is backward, ecological environment deteriorated and people's living difficult.

Agriculture is the basis of local economy. Without a well developed agriculture the local society could not be stable. Through analyzing the suitability of its physical, economic, social and technological conditions, the author discusses the comprehensive development of agriculture. The comprehensive development of the agriculture in this area could not only greatly enliven its economy, change its landscape, raise the people's standard of living, but also build Shanxi Province into an energy and industrial base, and realize the general target of national economic development by the year 2000 in this area.

In view of above-mentioned problems, the specific countermeasures for comprehensive development of agriculture in the Loess Plateau area are as follows:

### **1. Purpose**

The immediate purpose of carrying out the comprehensive development of agriculture is to meet the needs of economic development, particularly the local needs of food, and help the peasants to cast off poverty and get rich. The cardinal purpose is to coordinate relations among resource, environment and population, and to preserve comparative equilibrium among production, people's living and the environment.

### **2. Principles**

The comprehensive development of agriculture should follow natural and economic laws, handle properly the relationship among economic development, resources utilization, management and protection, the relationship between the immediate interests and the long-term interests and the relationship between the local area and the nation, so as to attain the maximum economic, ecological and social benefits. The author emphasizes that in order to change the area's productive outlook and cast off the poverty, we must combine development, utilization and management with protection, and all these must carry on synchronously, for they are interrelated and interdependent. Development and utilization are purpose, while management and protection are means. We must make the development to drive the management, and make the management to advance the development. So development and utilization may get twice the result with half the effort, and management and protection have a great vitality. Otherwise management and protection are just empty talks.

### 3. Targets

The targets of comprehensive development of agriculture is that it must utilize resources rationally, complete preliminarily agro-production system of combining farming with forestry and animal husbandry, control basically water and soil erosion, and realize good cycle in the ecological environment. Its specific targets are shown in Table 1.

**Table 1 The targets of comprehensive development of agriculture**

Items	1986	2000
Total grain output (billion kg)	225	380
Grain allotment per capita (kg)	276	400
Total agricultural output Value (billion RMB)	187	300
Peasant's income per capita (RMB)	310	800

The area has 170 million mu of cultivated land, on the average 2.13 mu per capita, a little more than the national average of 1.37 mu.

According to the growth rate of the national average annual population 1.2%, the population of the area will reach 95 millions by the end of this century. In that case the total grain output must attain 38 billion kilograms, or produce more 15.5 billion kilogram than 1986, if each person needs 400 kg per year. (see Table 2).

It is thus clear that accelerate comprehensive development of agriculture, the area is possible to be completely self-sufficient in grain.

**Table 2 Estimated increasing of grain output in Loess Plateau Area**

Way of increasing output	Increasing rate	Increasing of output
1. Increasing the transformal efficiency of light and heat	Going up from 0.5% to 1.0%	$146\text{kg} \times 170\text{million mu} \times 1/3 = 7.31\text{ billion kg}$
2. Increasing multiple cropping index in southeastern and southern parts to two crops per year	Going up 20-30%	$100 \times 1.7 \times 1/4 = 4.2\text{ billion kg}$
3. Transforming farmland of middle and low yield	Average per mu going up 15-25 kg	$15 \times 1.7 \times 0.7 = 17.85\text{ billion}$
4. Increasing utilization ratio of nitrogenous fertilizer to 1/3	1402-2421 thousand kg	$183 \times 0.82 = 15\text{ billion kg}$
5. Taping latent potentialities and transforming of irrigated land	Average mu going up 200 kg	$200 \times 0.48 = 9.6\text{ billion kg}$
6. Expanding the area under irrigation	Average mu going up 200 kg	$200 \times 0.2 = 4\text{ billion kg}$
7. Increasing the cover area of land plastic film	Average mu going up 25 kg	$25 \times 0.2 = 0.5$
8. After putting grass and crop rotation practice	Increasing yield 50%	$10 \times 0.006 = 60\text{ million}$
<b>Total</b>		<b>58.52 billion kg</b>

#### 4. Strategy

In order to attain the comprehensive development of agriculture, it is necessary to carry out the strategy of taking water and soil conservation and developing irrigation as the core, transforming middle and low-yield farmland as the base, increasing grain, cotton, oil and sugar crops as the targets, planting grasses and forests as the ties, developing township industries and side-line occupations as the break-through.

As this area has large population, there is a great demand for grain, and meantime the transportation distance is long, the grain problem has to be solved locally, in order to attain the stability of economics, politics and society.

The area's development has a long history, and there is not much arable land left, and the ecological conditions are already vulnerable. It is not suitable to reclaim more land. It is better to tap the latent productive power of the existing cultivated land, by increasing yield per unit area.

In such an arid and semi-arid area, there is little possibility of expanding irrigated land.

The development of farming can only utilize the limited water resource, and practicing dry farming technique, as to "walk on two legs". Under such circumstances, the area will have to preserve natural vegetation, conserving water and soil, preventing strong wind and fixing sand for improving environment. Hence, it is necessary to uphold the orientation of ecological agriculture, to treasure and protect natural vegetation, to extend man-made vegetation, and to develop combination of farming with forestry and animal husbandry.

In forestry, this area must practise such strategy of raising economic benefit as the core, realizing transformation from singly protective forestry to multiple functional forestry. Because forestry has the characteristics of greater and longer investment but slower effect. In order to increase economic benefit, following specific measures should be taken: (1) establishing timber forest base, particularly growing high yield forest rapidly; (2) protecting and conserving natural forest; (3) expanding the area of economic forest by planting extensively fruit trees, woody grain and oil crops; (4) establishing timber processing industry and fruit processing industry.

In animal husbandry, this area wants to carry on such strategy of planting grasses and increasing the output value of animal husbandry. If animal husbandry is weak, supplies of fertilizer and animal power will be insufficient, and farming will be unstable. Therefore the area must carry out combination of farming with animal husbandry. And in the area there is great possibility for developing animal husbandry: (1) conditions are dry, barren, microtherm and saline-alkali of the area is good for growing grasses, and their output is very stable; (2) as the area of mountains and hills is extensive here, grassland is plentiful; (3) The grassland is suitable for grazing cattle, sheep, and as compared with crops, the crude protein of grass is higher. Planting grass needs less investment, and less labour as well; (4) In the historical time, the area was semi-farming and semi-grazing. Thus developing animal husbandry here may rely on utilizing its original basis and personal professional knowledge or skill. And (5) in a large extent, planting grass may provide fuel for the rural inhabitants.

To develop animal husbandry, it is necessary to increase the primary productivity of forage grasses and the secondary productivity of domestic animals. The structure of livestock is to be adjusted according to the areal differentiation of grassland, feed and ecological conditions. In the plain area, as feed is plentiful, the stress should be put on the raising swine, milch cow and goat, and combining planting forage grass with processing livestock products, making conscientiously a good job of animal husbandry in farming region. In hilly areas, as natural grassland is extensive, meat cattle and goat should be developed.

For protecting forest land and grassland, the strategy for solving rural energy problem, must take ecological and mineral energy as the core, and develop constantly new energy wherever possible.

In the course of comprehensive development of agriculture, the objective law of indus-

trial development must be observed and "all position, many forms" be made a good job of rural industries and side-line occupations. Obviously township enterprises are the main way for the peasants to get rich. This area has to carry out such a development strategy of processing local mineral, ecological agricultural and side-line occupational products as the core. This is a break-through for bringing about the area a prosperous economy, supplying constructive goods and materials, enlarging reproductive capacity and improving the peasant's living standard and the external terms of agriculture. To develop rural industry and side-line occupation the area must be based on the abundant land, ecology, mineral and labour, tourism, information. And it must insist on the orientation of serving the large industry, local agriculture production, people's life and export trade, and try to join the network with national large enterprises, to realize the transition from primary industry to secondary industry, and at the same time, develop tertiary industry. To bring into fully play the rational and collective role of industrial cities and large-scale industry-mining area, enhance technical level, the area should collect widely market information, develop actively the famous brand, and the outstanding, special, new and rare products, in order to maintain stability in the market competition.

In addition, the area must utilize fully the land resource, develop three-dimensional agriculture and courtyard economy, which is a new tendency of comprehensive development of agriculture.

### **5. Steps**

The period before 1995 is the stage of adjusting and starting, mainly adjusting structure of land use and industries, and increasing agricultural production. Meanwhile, grasses and forests must be energetically planted, rural industry and side-line occupation be developed, economic profit be increased and peasant's living problem be solved.

The period of 1995-2000 is all-sided developing stage. This area must stabilize rational structure of agriculture, develop commodity production of agriculture, raise productivity of land and labour, and help peasants on the way to wealthy.

### **6. Emphases**

Under the guidance of national planning, adjusting structure of land use should meet the demands of social production, people's living and export trade, rational distribution of agro-production.

In the sectors, the area must take farming land as the principal part, combine farming land with forestry land and animal husbandry land, industry-communication land, town-village residential land etc..

In the region, Guanzhong, Yinchuan and Hetao plains, Lanzhou basin as well as some river valleys, must take farming land as the principal part. The loess hills and gully region

must carry out combination of farming land with forestry land, animal husbandry land. The windy and sandy area in the northern part of the Loess Plateau, must take forestry land and animal husbandry land as the principal part.

Among agricultural land, cultivated land is the basis. It is of vital importance to the development, utilization, structure and regional allocation of land use. This area must put into effective the policy of "mustn't firmly clacken grain production, develop actively diversified economy", set up comprehensive management institution of agriculture, and carry out combination of farming with forestry, animal husbandry. It must break firmly the land use pattern of "take grain as the key link", correct the tendency of "attaching great importance to cultivated land and neglecting the utilization of forest land and grassland." The cultivated land proportion may have 1/3 of agricultural land; grassland area is more than 1/3 of total account; the other 1/3 land is forestry land, built-up area etc..

The quality of cultivated land in the area is not high, productive capacity of land is coming down, and population is growing more, requiring a large quantity of grain. So the contradiction between production and requirement is conspicuous. Under these circumstance, this area must give priority to the needs of grain land. On allocation of cultivated land, grain crops land accounts for 75%, cash crops 10-15%, other crops 5-10%.

## 7. Ways

In the sense, pattern, range of development, the area must realize three transformations, from self-sufficient nature agriculture into commodity nature agriculture, from extensive management into intensive management, and from single grain production form of agriculture into organic whole of agriculture-industry-business. Only does the area do away with "small and whole" allocation, develop commodity production, can it then strengthen inherent vigors of economy, especially mass-owned investment capacity. Thus the Loess Plateau Area can change natural and economic complexion.

## 8. Tactics

First, adhering to the principles of "adapt to local conditions and appropriate centralization", the area may make an improvement of grain crops allocation.

Second, the area has to increase input of living work and material work, bring all farmland under irrigation and gardes in the productive condition, extensively utilize chemical fertilizers and other farm chemicals, mechanization, electrification in the means of production, science in the technique of production, and improve crop varieties. Especially the area must lay stress on input of science and technique, to combine scientific, technical development with resources exploitation.

Third, this area should strengthen land management and environmental protection, and thus it may pledge stable quantity and quality of the output of cultivated land.

Fourth, the area would adopt model management strategy of making network economics as the core. It would set up a series of service system that comprising network of consultation, information and feedback, economic substance of consultation, information and feedback, economic substance of all kinds as well as providing help in the distinct period of production.

Fifth, the area should construct market town, perfect commercial system, to speed up economic operation, in the meantime, take a good job of traffic construction, as opening passageway of goods and materials exchange in the inside and out of the area. On these bases, the Loess Plateau Area can realize specialization, regionalization and socialization of productive organization, as well as enterprisation of management and administration.

### 9. Some Problems Concerning the Development

1) For developing grain production, it must coordinate suitably with population growth. The area is necessary to regulate strictly blind and spontaneous growth of the population, to enhance the labourer's technical quality.

2) The area increase investment for agriculture in every possible way.

3) The area improve after-production of grain, such as threshing, store, transport, processing, selling etc., in order to reduce lose of reap.

4) A development policy suitable to the local conditions is required. Its aim is to increase peasant's benefit, so as to develop their enthusiasm, attain stable of comprehensive development.

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