

Analysis on Planning of Slop Cultivated Land Harassment in Yellow River Basin

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Abstract: In Yellow River Basin, there is large area of slop-cultivated land, which is not only the main source of grain production, but also the main source of soil and water erosion. The harassment of slop cultivated land focused on retying of the land to terrace, will control the soil and water erosion effectively, and prompt the local farmer get rid of poverty. The article analyzed several issues on planning of slop cultivated land, such as types of terrace building, in different region, grain yield, ratio of forest and grass land on uncultivated slop land, will make the planning of slop cultivated land harassment and the cost estimate more practical.

Keywords: Yellow River basin, slop cultivated land, harassment, issues, analysis

The slop land is 60% of total plowland in Yellow River basin; it is main source of local grain and also the main origin of eroded soil. No land hadn't been cultivated, no place hasn't been planted, planted more but harvest little, year after year, day after day, the soil and water is gone, the poor is left. Now the State concerned more and more about environment construction, especially after completely actualization of the policy of 'move back the slop land to forest and grass, seal a mountain pass and evanescence, using grain as relief fund, individual contracting', the slop land management gets its good opportunity. Consider the long-term benefit, the yellow river basin should accumulate withdraw the slop land to forest and grass under the condition of grain production could self-supplying. According to the difference of topography and physiognomy, population density, type and depth of soil, rainfall, and unit yield of land, the types and quantity of terrace, the ratio of forest and grass and also the investment should vary.

1 Selection of terrace types

In the no 5 subzone of rolling and hilling region and subzone of Qinghai, Gansu, Ningxia, Inner Mongolia in of soil and stone mountain zone, the population density is less, and they have little rainfall. In these regions, terrace with separated zone can be built on slop between 15 and 25 degree; trees and grass can be planted in separated zone. In soil and stone mountain zone of Shaanxi, Shanxi and Henan, it has more rainfall and more stone, but soil layer is thinner, slop is steep, so the terrace can be built with stone ridge, and it should be little narrow. In river bank and loess plateau zone, the rainfall and population density is greater, soil layer is depth, slop is even, the slop degree is 3 degree generally, and sometimes it can reach to 5—8 degree. The terrace should be constructed according to the standard of even slop area (20m—40m wide). In sand and dune zone and arid campo zone, the rainfall is less, land is even, conglomerate ability of soil is low, but it has abandon of water underground. In this region, the main measures should be small-scale irrigated land, terrace also adopts the standard of even region, and its ridge should be grass or shrub hedge. In other zones, terrace can be built with soil ridge, the slop below 10 degree should adopt standard of even slop, and which between 15—25 degree should adopt the standard of steep slop, and call for planting grass on its soft ridge.

2 Identification of unit yield of different region

Changing the slop land to terrace is a main measure in slop land harassment, and also the first condition of moving back the slop land to forest and grass. To identify proper quantity of terrace, it needs to find out the unit yield of terrace, warping land, irrigated land slop land, and to analysis the requirement for grain on basis of average capital grain be more than 400kg, then the area of terrace need to be built.

Based on the analysis of check and accept data of 32 small watershed of second and fourth demonstration small watershed project in Yellow river basin, the unit yield of farmland is as the Table 1.

Table 1 Unit grain yield of farmland in different region (kg/hm²)

zone	terrace	Warping land	Irrigated land	Slop land	Average of basic farm land
Hilling 1—2	1,716.0	3,855.0	4,263.0	642.0	2,019.0
Hilling 3—5	2,191.5	2,920.5	4,779.0	1,117.0	2,460.0
Loess plateau	2,608.5	4,401.0	5,299.5	1,650.0	2,878.5
Soil and stone mountain	2,950.5	4,630.5	5,850.0	2,172.0	3,910.5
River bank zone	3,540.0	5,820.0	6,618.0	1,965.0	4,201.5
Sand and dune	1,425.0	3,075.0	4,575.0	1,357.5	3,189.0

Note: The unit yield of basic farm land and the slop land is come from the average of check and accept data of 76 small watersheds of second and third phase

3 The ratio of moving back slop land to forest and to grass land

After part of slop land changed to terrace according to the local grain requirement, there still some slop land left, this need to be plant trees and grass. The ratio of arbor tree, shrub, commercial tree and grass must be rational, because it will directly affect the rationality of planned measures, cost budget and their benefit. Detailed analysis of check and accept data of 35 small watersheds of no2 to no4 phase show the proper ratio of all measures after moving the slop land back indifferent region (see Table 2).

Table 2 Ratio of moving slop land back to forest and grass in different region (unit: %)

Region	Arbor	Shrub	Commercial tree	Grass	Total
Hilling 1-2	18.1	10.2	37.5	34.2	100
Hilling 3-5	10.7	6.0	37.4	45.9	100
Loess plateau	17.7		53.7	28.6	100
Sand and dune	6.8	12.5	32.3	48.4	100
Soil and stone mountain	23.1		32.1	44.8	100
River bank	22.8		73.4	3.8	100

Existing slop land has thicker soil and much better morphology than the uncultivated slop, hill and gully, furthermore, it had been farmed for many years, its conditions is relatively better, so it is moved back mainly to the commercial trees and grass, shrubs will be planted mainly on the uncultivated slop. The Table 2 bellow show that, the commercial tree's ration is higher than others, it indicator economic

benefit is concerned in all regions; the second higher is grassland. After harassment, guarding is strengthened, grazing control measures had been implemented, grass plantation can meet the fodder requirement of pen-feeding; slop land is even, population density is greater, it is rational to had a low ratio of shrub; In soil and stone region, there is better vegetation, thin soil and less farmland, and the shrubs has low economic benefit, so shrubs can't be planted in limited slop land; In sand and dune region, there is level morphology, sparse population, less rainfall, lean soil, and strong wind, the shrubs had a higher ratio than arbor tree because of its better adaptability; In gully and hilling region, there is fewer shrubs, most of them is planted on slops more than 25 degree. Considering the adaptability and growth status of arbor trees, the ratio of shrubs can be higher in individual planning. To sum up, the data in Table 2 is rational.

4 Measures distribution

The terrace should locate in places that have good quality of soil, level slop, and integrity plot, near to village, advantage traffic, lower site and neighbour to water source. In some places, using of tintage machine and irrigation should be closed in consideration. In favor of agriculture operations later, the road in field should be built at first, and its width will be 2m—3m, its gradient will be no more than 15%. Using the road as the skeleton to distribute the terrace, it should have proper width and no limited length. Some small scale drainage and store engineering such as water cistern and pool should be planned in areas where terrace can't store all run off of storm, this kind of engineering should also be planned at the location above the terrace, where some run off can enter the terrace, to ensure the safety of the terrace.

The commercial trees should be allocated at the places that is near to village, south faced and back to the wind, level slop (less than 25 degree), to convince to management; Most shrubs should located in steep slop land (more than 25 degree) far from village; Arbor trees should planted in steep slop land that have better condition than shrubs; Grass land generally distribute in steep slop land far from village, its plot depends on decentralization of farmer household, and not to be too large.

In conclusion, to harassing the slop land in Yellow River basin, the relationships between farmer's need for grain and money, vegetation construction and economic benefit, present and long-term benefit should be treated in a proper way. By moving farmland to the gully bottom, some new high productive farmland should be built according the characteristics of different regions, surplus slop land will be used to plant tree and grass. Implementing the combination of arbor tree, shrub and grass, give prominence to pen feeding and grass plantation, developing the fruit orchard and commercial trees to mobilize the enthusiasm of farmer for harassing, adopting the rational measures ratio and investment, achieve the effective using and development of land resources, and to contribute to decrease the sediment in Yellow River, improve the environment, prompt the local farmers to get rid of poverty and realize the sustainable development of local society.