Design Techniques for Site Arrangement of Hollow Village Sites in Mountainous Hilly Areas

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Abstract

The phenomenon of hollow villages is common in rural areas, especially in mountainous and hilly areas due to its characteristic topography, the phenomenon of hollowing is more serious. In order to reduce the waste of land resources and make reasonable and efficient use of land resources, the field design is particularly important when the hollow village is rehabilitated to cultivated land. This article elaborates from the two aspects of field design and tillage maintenance. Provide scientific reference for the renovation of hollow villages and cultivated land.

Keywords

Mountainous and hilly areas, **Hollow villages**, **Site consolidation**, **Field design.**

1. Introduction

Some scholars believe that China's hollow villages are the differences in the spatial form of the village's extensive external development and internal decline due to the contradiction between the rapid development of village construction and the backward planning and management system under the condition that urbanization lags behind non-agriculturalization. Phenomenon [1]. The phenomenon of hollow villages in China is gradually increasing. On the one hand, it causes a serious waste of land resources, and on the other hand, it adversely affects the rural ecological environment [2]. Rural hollowing is affected by a combination of factors such as nature, economy, society, policy, and technology. Therefore, there are stages and differences in the evolution of rural hollowing, which objectively produces different types of rural hollowing areas under different driving forces.

The most important thing in the design of the field for the hollow village remediation is to maintain the soil strength of the tillage layer. In order to ensure the quality of cultivated land, it is necessary to maintain the thickness of soil and cultivated layers and other physical and chemical indicators necessary for crop growth. When the soil layer of the cultivated land is thin, the soil layer needs to be thickened by deep-cultivating loose soil, lower layer loose blasting or guest soil; in the land leveling construction, the cultivated soil must be protected by stripping and reducing the cultivated layer, and the cultivated layer is not damaged No loss, no landfill.

2. Field design

Hollow villages in mountainous and hilly areas are renovated as farmland and generally designed as terraced fields. The layout of the terraces combined with the terrain of the hollow village in the hilly area, using the trenches and roads as the skeleton, the big bends are straight, the small bends are straight, and they are arranged along the contour lines. The shape is long, circular or fan-shaped. Inside the terraces, side ditches, back ditches and drainage outlets are set up. Drainage ditches outside the terraces are connected to facilities such as reservoirs, gullies, and drainage ditches. Storage, drainage, and drainage measures are taken to suit local conditions to make slope runoff harm . In

order to facilitate farming, the length of the terraced field is generally 100 ~ 200 m, the side of the terraced field is about 1 m, and the reverse slope should be kept at about 10 °so that the outside height is low. Fields with irrigation conditions must maintain a ratio of 1/300 to 1/500 in accordance with the direction of the water flow. The width of terraced fields is determined by the local terrain and soil quality. The larger the slope of the ground, the narrower the width of the field, and the lower the height of the ridge, the narrower the width of the terraces. Generally, the width of the terraced fields is 5-10 m. Terraced fields should meet the requirements of irrigation and drainage. The local undulating height difference of terraced fields should be within 10 ~ 15 cm, and the ratio of 1/300 ~ 1/500 should be kept in the longitudinal direction of the fields to facilitate drainage. The construction of terraces (grounds) requires ridges to be safe and stable, occupying a small area, and requires less labor. The height of the field ridge should be determined according to the requirements of topography, soil texture, soil stability, and field width. Field ridge materials mainly include ridges and stone ridges, followed by biological ridges. The height of terraced ridges is preferably <1.5 m, and the height of stone ridges is preferably <2.0 m. The outside slope of the field ridge is 55 °~80 °, and the inside slope of the field ridge can take 50 °~ 60 °. The width of the top of the field ridge is generally 0.30 ~ 0.40 m. The border between the grids is the field barn, which is generally 0.15 to 0.30 m wide and 0.20 to 0.40 m high. The cross-section parameters for the reconstruction of hollow villages in mountainous and hilly areas as terraces are based on GB/T 30600-2014 "General Standards for the Construction of High-Standard Farmland" and NY2148-2012 "Standards for the Construction of High-Standard Farmland". The specific parameters are shown in Table 1.

Table 1 Section parameters of horizontal terraces

Terrain slope/ °	Clear surface width/m	High of Tiankan/m	Tiankan outside slope/ °
1~5	5~10	0.5~1.1	80~75
5~10	4~8	0.7~1.4	75~70
10~15	2~6	1.1~1.9	70~65
15~20	2~4	1.5~2.1	65~60
20~25	1~3	1.6~1.9	60~55

Note: The field width and field slope in this table are applicable to areas with thick soil layers and soil field ridges. For areas with thin soil layers, the field width should be appropriately reduced according to the soil layer thickness.

3. Fertility maintenance in tillage layer

3.1 Field block topsoil protection

When carrying out the hollow village renovation project in mountainous and hilly areas, in general, stripping and backfilling of topsoil (cultivation layer) must be performed. The topsoil retention in paddy fields should not be less than 80%, and the topsoil retention in dry land should not be less than 70%. For the demolition of the ground houses and roads in hollow villages in mountainous and hilly areas, the surface soil that is suitable for cultivation should be stripped from 20 to 30 cm, and the surface soil should be stacked and stored in appropriate places in the flat area. Use machinery to level and compact, so that the shape, size, and height of the plough bottom can meet the planning and design requirements, and form a plow bottom with an anti-seepage and leakage resistance of about 20 cm. The bottom level of the paddy field plough is a horizontal plane, and the bottom level of the dry land plow is a slope of 1 ~ 2% slope. Subsequently, the piled and stored topsoil of the tillage layer is backfilled to the bottom of the plow, and the thickness and flatness of the tillage layer meet the requirements. Combined with the topsoil stripping and backfilling work, the barrier layer within 40 cm below the surface should be removed. In the irrigation paddy field leveling construction, when the excavation and filling thickness is less than 10 cm, the topsoil stripping may not be performed.

3.2 Soil cover

The agricultural land in hollow villages in mountainous and hilly areas is too thin, the soil thickness is less than 60cm, and the content of soluble salts and alkalinity in the soil exceeds the limit; In other

cases, it is necessary to use backfill technology to thicken the soil layer and transform the cultivated land. The soil layer is too thin or the soluble salt content exceeds the standard, which cannot meet the soil conditions required by the crops. Guest soil cover technology is required to increase the soil layer thickness. For agricultural land, it is necessary to thicken the soil layer, and the cover thickness is determined to be ≥200mm according to the specific conditions. The garbage backfill depression area should be ≥600mm, and the thickness of the village construction wasteland should be ≥500mm. For the soil layer that needs to be thickened, the thickness of the soil layer should be determined separately according to the specific situation. Generally, the thickness of the soil layer after covering should not be less than 60 cm, and the cultivated layer can reach 20 cm to 25 cm. The finishing of harmless abandoned industrial mines should be appropriately thickened. The thickness of the soil layer after covering should generally not be less than 150 cm. For hazardous waste industrial and mining land such as lead, sulfur, arsenic, mercury, tin, etc. are generally not included in the scope of land development and consolidation.

Newly developed cultivated land should implement soil improvement measures, such as applying straw and farm manure to increase soil organic matter content, loosen soil, and improve water permeability, aeration, and water retention performance of the soil. Shallow farming layers should be turned deeper each year to improve the soil. For sticky soil, use sand to change the viscosity; for sandy soil, it should be mixed with mud to change the sand to improve soil permeability.

4. Conclusion

In summary, based on understanding and following the laws of nature, we should take systematic thinking as the guide, ecological governance as the means, land engineering as the main means, and the supporting engineering technologies such as land, water, roads, and forests are of low quality. Pollution, damage and destruction of hollow village land in hilly and hilly areas will help to improve the living environment of human beings.

References

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