



Hawberry (*Rosa Roxbunghii*) High-Quality Development

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Abstract:

Abstract: Because modern Agricultural production cannot produce more high-quality agriculture produce and get more benefit to meet the people's increasing needs for a better life, food security and health, Agriculture development had entered new stage of Agriculture high-quality development. Agriculture high-quality development is to take effective measures or methods to make land produce maximum yield and benefit. In order to meet the need of people's increasing needs for a better life and high-quality Agriculture produce, the most important work in the future is to make land produce more better and health food to meet the people's needs for a better life and high-quality Agriculture produce. For example, Pears belong to the Rosaceae family and their fruits are an important type of fruit, we should select the best pear varieties, Determine the appropriate initial density for pear trees in different regions, determination resources use limit by pear plants, vegetation carrying capacity and the critical period of plant resources relation regulation to make pear plant grow well and produce high-quality produce to get maximum yield and benefit and realize sustainable use of nature resource and pear high-quality development.

Keywords: Resources use limit by plants; Vegetation carrying capacity; Critical period of plant resources relation regulation; High-quality development.

Introduction

Agricultural development has gone through a long process. According to the efficiency of resource utilization, the development of agriculture can be divided into three stages (Guo 2025): (1). Primitive agriculture, in the primitive agriculture stage, the population was small and the labor productivity was low. People lived by gathering wild fruits and hunting wild animals;

(2) The stage of improvement, in this stage, humans began to cultivate wild plants and gradually transformed them into suitable crops for farming through selection and cultivation, such as wheat, barley, rice, corn, etc. To improve agricultural production efficiency, humans invented various farming tools, such as plows, hoes, sickles, etc. As agriculture developed, people began to settle down on fertile land, forming fixed villages or communities. Humans began to domesticate wild animals as livestock, such as cows, sheep, pigs, etc., providing meat, power and fertilizer for humans. To solve the water problem in arid areas, humans began to build irrigation systems, such as canals, wells, and karez in xinjiang, China.

As agriculture further developed, land gradually became an important production resource. People began to realize the value of land and gradually formed land ownership. With the improvement of productivity and the increase of social wealth, the social division of labor among people became increasingly clear, and class differentiation also gradually emerged. (3). The high-quality development stage. With the improvement of labor productivity, people pursued greater output and benefits. With the proposal of the concept of high-quality development in 2017, agricultural development had entered a new stage of high-quality development. However, natural resources are limited, and people cannot overuse natural resources and pursue the maximum output and benefits beyond the carrying capacity of vegetation. Thus, agricultural development entered a new era of high-quality development. Agricultural high-quality development adopts effective methods and technologies, including selecting superior plant species and varieties, adopting appropriate initial planting densities, with the initial planting density being greater than or equal to the carrying capacity of vegetation, especially the carrying capacity during the key period of plant resource regulation, including artificial intelligence and other plant resource regulation technologies. The theoretical basis of agricultural high-quality development is the theory of resource utilization limit, the theory of vegetation carrying capacity, and the theory of key period of plant resource regulation.

Since 2017, Chinese government put forward high-quality development, so agricultural development had entered the new stage of high-quality development. Agriculture high-quality development is to take effective measures or methods to make land produce more high-quality agricultural products to meet the people's increasing needs for a better life and high-quality Agriculture produce (Guo 2025). The purpose of the paper is to introduce the theoretic foundation and method of Sustainable use of soil resources and agricultural high-quality development.

Study method

To solve the questions such as soil and vegetation degradation, crop failure and low quality of agricultural products and economic benefit in modern agricultural production to match the need of the people's increasing needs for a better life and crop types, yield and benefit, Author reviews a lot of paper and find that the according to the efficiency of resource utilization by plants based on the recent years innovation studies (Guo *et al*, 1990, 2002, 2003, 2004, 2009, 2013; Guo 1990, 2010, 2014, 2020, 2021, 2022, 2023, 2025). The whole process of agricultural development can be divided into three stages: Low level development stage or primitive agriculture, Level improvement stage and high-quality development new stage. Agriculture development enters the new stage of high-quality development. We should take effective measures and method to make land produce more and healthy food and service to meet the people's needs for a better life and high-quality Agriculture products.

Rosa roxbunghii is the fruit of the perennial deciduous shrub *Rosa roxbunghii*, also known as Mountain King Fruit, Thornberry Fruit, Frang Fruit, Tsili, Mulberry, Pineapple-like Thornberry, Nine-headed Bird, Wen Xian Fruit. It is a nutritious and beneficial fruit for health and fitness. It is a rare fruit. It grows on sunny slopes, valleys, roadsides and shrub thickets at an altitude of 500 meters to 2500 meters. It is a natural wild fruit in Guizhou, western Hubei, western Hunan, Liangshan, and Mengniang areas. It is also widely

cultivated artificially in Guizhou Province and Kaifeng City, Henan Province.

The harvest period of *Rosa roxbunghii* is less than 30 days. *Rosa roxbunghii* is a wild small shrub. It blooms pink, red or dark red flowers from April to June, and bears fruits in summer and autumn. The fruits are mostly flat spherical, with a cross-diameter of generally 2 centimeters to 4 centimeters. The fruits ripen in August to September, are yellow, and sometimes have a red halo. The flesh is crisp, and after ripening, it has a strong fragrant aroma. There are small thorns on the fruit skin, which are commonly called "thornberry". The fruit contains abundant vitamin C, and is called "the king of vitamin C". Tannin is 500 milligrams to 1000 milligrams; acid is about 1 gram; the total sugar content is generally 4 grams.

The function of *Rosa roxbunghii*

1. Enhance immunity: Hawthorn dried fruits are rich in vitamin C, flavonoids and other antioxidant substances, which can eliminate free radicals and enhance immunity, preventing infections and diseases¹.

2. Promote digestion: Hawthorn dried fruits contain abundant dietary fiber and acidic substances, which help promote intestinal peristalsis, increase satiety, reduce appetite, and also promote the secretion of digestive juices, which is beneficial for digestion and absorption of food.

3. Lower blood lipids and blood pressure: Some components in hawthorn dried fruits have the effect of lowering blood lipids and blood pressure, which can reduce cholesterol deposition on the vessel walls and prevent cardiovascular diseases such as atherosclerosis.

4. Protect liver and promote liver health: Hawthorn dried fruits have a certain protective effect on the liver, which can reduce the burden on the liver, promote the repair and regeneration of liver cells, and prevent liver diseases.

5. Antitumor: Some components in hawthorn dried fruits have antitumor effects, which can inhibit the growth and spread of tumor cells and prevent the occurrence of cancer.

Beauty and skin care: The vitamin C and antioxidant components in hawthorn dried fruits are beneficial to the skin, can promote skin repair, reduce wrinkles and pigmentation, and long-term consumption is helpful for maintaining the luster and elasticity of the skin.

6. Other effects: Hawthorn dried fruits also have the effects of assisting in lowering blood sugar, eliminating phlegm and stopping coughing, and relieving alcohol intoxication.

Results

1. Theoretical foundation of Hawthberry high-quality development

2.1 Resources use limit by plants

Because natural resources are limit, the utilization of natural resources by plants is limit. To carry out sustainable use of natural resources and Agriculture high quality development, we must use the natural resources in sustainable way, which is expressed by the natural resources use limit by plants and vegetation carrying capacity, especially the vegetation carrying capacity in the critical period of plant resources relation regulation because the natural resources use limit by plants is the controlling limit plants use natural resources. Resources use limit by plants can be devited into three types, space resources use limit by plants in soil water and nutrient rich regions, soil water resources use limit by plant in

water-limited regions and soil nutrient resources use limit by plant in soil nutrient limited regions, expressed by indicator plant. The natural resources use limit by plants changes with plant species and location (Guo 2010, 2017, 2021, 2023, 2025). For example, natural resources use limit by plants in loess hilly region in water-limited region is the soil water resources use limit by plants, which is the soil water resources in the maximum infiltration when soil water content is equal to wilting coefficient. The indicator plant for original vegetation is dominate species, especially constructive species, the uppermost dominant species, which is native to the local region because for a long time they have developed a good relationship with the local condition. The indicator plant for non-Native vegetation is goal or cultivated plant species (Guo 2010, 2014, 2020).

2.2. Vegetation carrying capacity

The vegetation carrying capacity is the ability of nature resources or land resources to carry vegetation in given time and space, expressed by the plant density of indicator plant. The vegetation carrying capacity can be divided into three classified into three types, which are space vegetation carrying capacity in soil water and nutrient rich regions, soil water vegetation carrying capacity in water limited regions and soil nutrient vegetation carrying capacity in soil nutrient limited regions. For example, in water-limited region, the vegetation carrying capacity is soil water vegetation carrying capacity, which is the ability of soil water resources to carry vegetation in given time and space because soil water is the most important factor to influence plant growth, yield and benefit. Plant resources relationship is very harmony and plant grow well to bear fruit but the goods and service cannot meet people's need in the stage of primitive agriculture, a lot of original vegetation has been changed into non-native plantation such as Saskatoon berries, red plum apricot and corn in the semiarid region, China. Some plant such as Saskatoon berries, grow and develop well, suitable for local climate, easy to produce high-quality produce. But another plant, such as corn and red plum apricot, they are not suited to the local climate and need to regulate plant resource relationships.

2.3. Critical period of plant resources relation regulation

As plant grow, plant canopy and root grow great, plant use more resources. Plant resources relation changes with time. When the resources plant use in the canopy and root is equal to natural resources use limit by plants, plant resources relation enters the critical period of plant resources relation regulation. The ending time of the critical period of plant resources relation regulation is the ineffective time of plant resources relation regulation such as the fruit stopping expanding or mature, stopping use plant ecological benefit. The critical period of plant resources relation regulation is the most important time in the whole process of plant growth and yield and benefit cultivation, which is can be expressed by the amount of available natural resources in canopy or root zone. The vegetation carrying capacity in the critical period of plant resources relation regulation decides the maximum yield and benefit.

3. Methods of Hawberry high-quality development

Pears belong to the Rosaceae family and their fruits are an important type of fruit with various benefits and functions. Here are the details:

Because the carrying capacity in the critical period of plant resources relation regulation decides the maximum yield and

benefit, we must take the theories of resources use limit by plants, vegetation carrying capacity and the critical period of plant resources relation regulation as a guild, select excellent tree species or varieties, and take appropriate initial planting densities and effective measures, such as weed according to the effect of weed on crop, application of fertilizer according to suitable amount of fertilizer and water according to the plant water requirement to ensure plant grow well and get the maximum yield and benefit. If the plant density exceeds the vegetation capacity in the critical period of plant resources relation regulation, the plant resources relation should be regulated based on vegetation carrying capacity, appropriate canopy depth (Guo 2025) or appropriate number of leaves, especially the vegetation carrying capacity or appropriate number of leaves in the critical period of plant resources relation regulation because as fruit plant planted, generally, the plant density is not changed, otherwise the further increase plant use natural resources will lead overuse of natural resources because available natural resources is more than natural resources used by plant, which will lead to the decline of vegetation and the decline of grain yield and quality (Guo *et al*, 2002; Guo & Shao, 2003, 2004, 2010, 2013; Guo 2014; 2021a and 2021b, 2023, 2025). And then, we have to regulate the relationship between reproductive growth and nutritional growth according to appropriate number of leaves and the rate of leaf and fruit, high-quality fruits, meeting market demands. The vegetation carrying capacity is the function of plant species, time and location (Guo 2014, 2021, 2025). For example, vegetation carrying capacity in water-limited region is soil water vegetation carrying capacity, which is the ability of soil water nature resources to carry vegetation, which changes with plant species, times and location (Guo 2014, 2021, 2023, 2025).

4. The direction of Hawberry development in the future

Due to the extensive area of agricultural land, people need more healthy food, and the population is also continuously increasing, the world's population has now exceeded 8.2 billion, different regions have different climate and crops suitable for growth, therefore, we have to select superior plant species or varieties based on market demand and site conditions, determining superior plant species or varieties in different regions, setting appropriate initial planting densities, and determining the resource utilization limits, vegetation carrying capacity, and key periods for regulating plant resource relationships of superior plant species or varieties, in order to achieve the maximum yield and benefits, is the research direction for high-quality agricultural development in the future. We should establish high-quality Hawberry development demonstration bases in different regions to study the theories and methods of high-quality agricultural development in different regions, achieve sustainable utilization of natural resources and high-quality Hawberry development, and meet people's needs for a better life, as well as their demands for high-quality Hawberry products and nutrition.

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Additional Information

Competing Financial Interests statement:

There are no competing financial interests

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