Agricultural Research & Technology
Open Access Journal
ISSN: 2471-6774

Juniper Publishers
key to the Researchers

Research Article
Volume 29 Issue 5 - March 2026
DOI: 10.19080/ARTOAJ.2026.29.5564665

Agri Res & Tech: Open Access J
Copyright © All rights are reserved by Zhongsheng Guo

The Methods of Agriculture High Quality Development

Zhongsheng Guo[1,2*]

[1]*Northwestern A & F University, Yangling, China*

[2]*ISWC, CAS & MWR, Yangling, China*

Submission: December 08, 2025; **Published:** March 23, 2026

***Corresponding author:** Guo Zhongsheng, Northwestern A & F University, Yangling, China & ISWC, CAS & MWR, Yangling, China

Abstract

Now, Agricultural development has entered new stage, agriculture high quality development. we should take some methods, such as selecting excellent plant species or varieties, taking appropriate initial plant density and effective measures to ensure plant grow well and get the maximum yield and service and realize sustainable utilization of natural resources and agriculture high quality development. The theory foundation for Agriculture high quality development is the resources use limit by plants, vegetation carrying capacity and critical period of plant resources relationship regulation, which includes space resources use limit by plants, space vegetation carrying capacity and the critical period of plant space resources relationship regulation, soil water resources use limit by plants, soil water vegetation carrying capacity and critical period of plant water relationship regulation, and the soil nutrient resources use limit by plants , soil nutrient vegetation carrying capacity and critical period of plant nutrient relationship regulation.

Keywords: Plant growth; Nature resources; Resources use limit by plants, Vegetation carrying capacity; Critical period of plant resources relationship regulation; Maximum yield and benefits; Sustainable utilization of natural resources; Agriculture high quality development

Introduction

Agricultural development has gone through a long time. According to the rate of resources use, the long Agricultural development can be divided into the three stages, original Agriculture stage, yield and quality improving stage and the agriculture high quality development, and now entered the new stage, agriculture high quality development [1,2,3]. The high-quality development of agriculture is to take some measures and methods to make the land produce the maximum output and services to meet people's yearning for a better life and the needs of agricultural production services [1,2,3]. The theory foundation for Agriculture high quality development is the resources use limit by plants, vegetation carrying capacity and critical period of plant resources relationship regulation, which includes space resources use limit by plants, space vegetation carrying capacity and the critical period of plant space resources relationship regulation in the soil water and nutrient rich regions, soil water resources use limit by plants, soil water vegetation carrying capacity and critical period of plant water relationship regulation in water-limited regions , and the soil nutrient resources use limit by plants , soil nutrient vegetation carrying capacity and critical period of plant nutrient relationship regulation in the soil nutrient limited regions.

Now, because overuse of fertilizer, overdose application pesticide and introduction of non-native plant species or varieties, initial planting density is too high more or too smaller than vegetation carrying capacity in the critical period of plant water relation regulation, exotic plant species or varieties changed the plant water relationship, which easily result in soil degradation and crop failure or waste of soil resources and are unfavorable for the sustainable utilization of soil resources and crops high-quality production. Therefore, it is necessary to estimate and take initial planting density and adjust the plant resources relationship and obtain the maximum yield and services to realize the sustainable utilization of soil water resources and crops high-quality management. So, we should select excellent plant species or varieties, take appropriate initial plant density, see the picture1. and effective measures to ensure the healthy growth of plants, get the maximum yield and service and realize the goal of cultivation. The purpose of the paper is to introduce the methods of carrying out Agriculture high quality development.

Method and material

Study site

The study site located in the Shanghuang Eco-experimental Station,which belong to the semi-arid region of the Loess Plateau, in the Eastern 20 Km from Guyuan County, China. The area was located in a hilly loess region with an elevation range of 1,534 to 1,824 m and slope gradients of about 8˚C and the slope gradients below the valley shoulder line is more than 25˚C. The main soil type is Huangmian soil (Calcaric Cambisol, FAO 1988) that is developed from loess and is susceptible to soil and water losses, which are serious in this region. The rainfall is unevenly distributed in the year with a mean annual precipitation of 416 mm, and rainfall from June to September accounts for 64.7 % of the total annual precipitation. The coefficient of variation of precipitation among the years from 1983 to 2001 was 23.8% and rainfall amounts ranged from 259.9 mm in 1991 to 634.7 mm in 1984, with a median rainfall amount of 434 mm, see Figure 1 & Figure 2. Mean solar radiation is 5, 342 MJ m^2; annual average temperature is 7.0˚C. Plant growing period is 152 days. Groundwater level is more than 60 meters [4]. Low temperature, frost and drought are the main disaster weather which influence sustainable produce of red plum apricot. Since red plum apricot introduced in 1988 from Shaanxi province to the Shanghuang Eco-experimental Station.

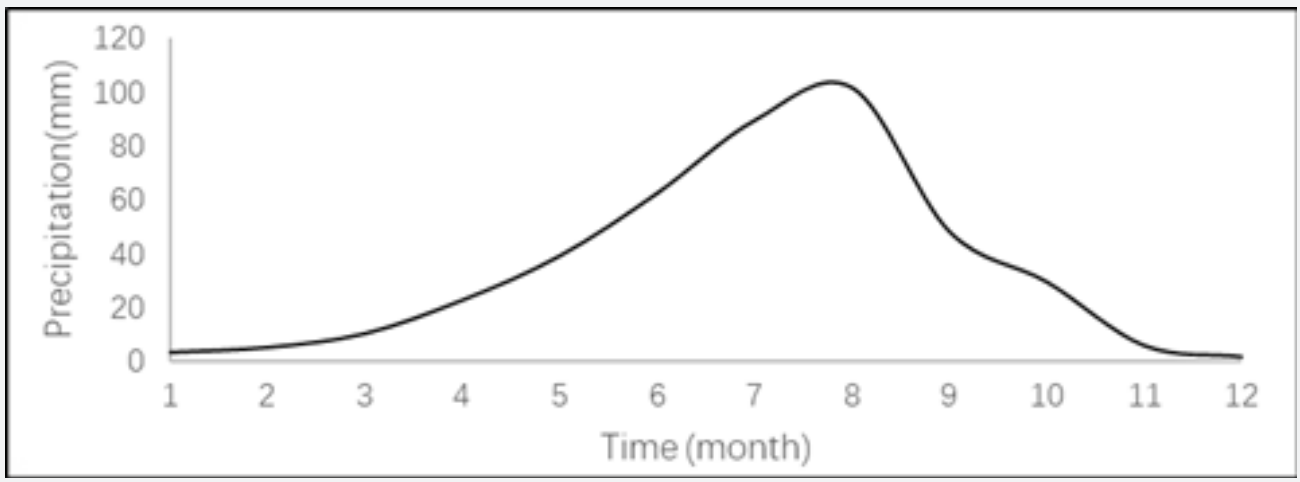

Figure 1: The Location of Shanghuang eco-experiment station in China.

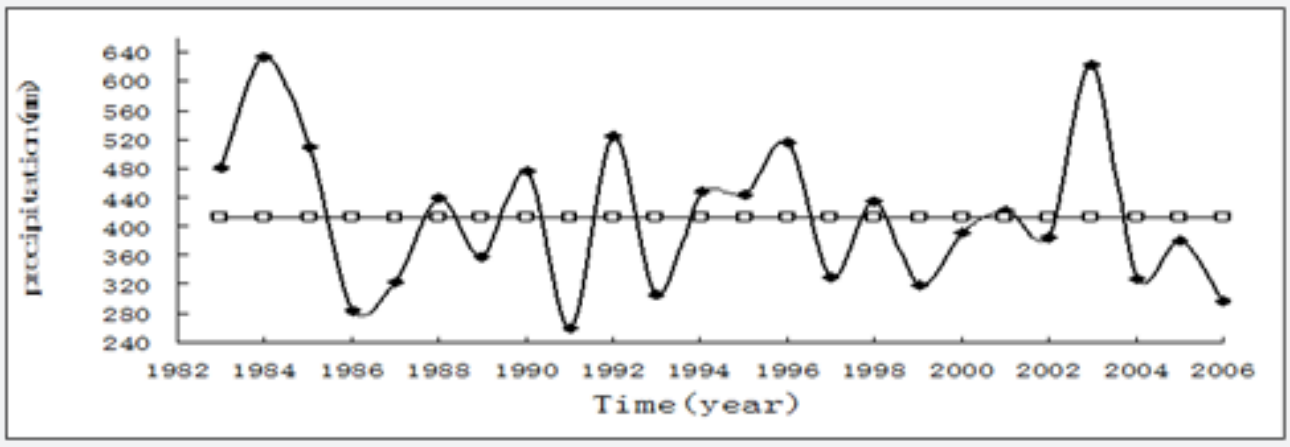

Figure 2: Change of precipitation with year in the Shanghuang Eco-experimental Station.

How to cite this article: Zhongsheng G. The Methods of Agriculture High Quality Development. Agri Res & Tech: Open Access J: Open Access J. 2026; 29(5): 556465. DOI: 10.19080/ARTOAJ.2026.29.556465

Because the precipitation is less, and the seasonal and interannual variations of precipitation are larger, soil dry often happens in the dry years, which will cause soil degradation, vegetation decline and corn failure, or waste of soil water resources because planting density is smaller than soil water carrying capacity for vegetation in wet years. In 1987, The introduction experiment of fine fruit trees was carried out in Shanghuang Ecological Experimental Station in 1987. The improved mei apricot grown in Shanghuang Ecological Experimental Station was named red plum apricot and promoted on a large scale because the plum apricot imported from Mei County, grew well and was redder in color than the mei apricot grown in Mei County, China, and the quality of the plum apricot was better than that grown in Mei County [5]. On June 24, 2002, in the semiarid Loess hilly region with relatively uniform site con-dictions in the middle of the Heici mountain, the soil was turned, the land was levelled and the caragana was sown, and five areas with an area of 100m were established (20m in long × 5m in wide) of the standard runoff observation field along the slope, the experimental sowing amount is 2.0, 1.5. 1.0, 0.5kg /100m and abandoned land for many years (control). Plot elevation of the experiment site is about 1650m, the slope of the plot is about 8°C. In the central area of each runoff field, two aluminum alloy casing were placed 1m apart and along with the slope.

Results

Better plant species or variety

From 1987 to 1991, 77 varieties of fruit tree species, such as apple (*Malus pumila*), pear (*Pyrus*), grape (*Vitis vinifera L*), peach (*Prunus persica*), plum (*Prunus salicina*), walnut (*Juglans regia L*), date (*Ziziphus jujuba Mill*) and mountain plant from Japan, Shaanxi Fruit Tree Institute and Northwest Agricultural University were Planted in Shanghuang, Guojiawan and other experimental orchards in the semiarid loess hilly regions. After analyse of accouple of years data, the red plum apricot is a good economic tree and promoted since 1995 [6]. Since 2003, the local government fast promote the development of Red Plum Apricot because the apricot is rich in juice, soluble solids content 51 (14.3%), potassium (410.8 mg per 100 g), selenium and Vc (8.3 mg per 100 g). The potassium 52 content of red plum apricot is higher than that of apple, pear, peach and grape. After a couple of years study in Shanghuang Eco-experimental Station, red plum apricot is selected and popularization because red plum apricot fruit is mature early, and fruit is larger, and quality is high, and production is stable [1,3]. Because red plum apricot is perennial plant, we can decide the better plant species according to a couple of years research. As for one year plant, we can decide the better plant species to plant in the next year according to the relationship between best plant species or varieties growth and weather condition made by a couple of years research, weather report and market need forecast because climate change and market need for agriculture produce change with time [5].

Estimation of suitable Initial Planting Density

Suitable Initial Planting Density is equal or bigger than initial planting density.

Estimation of optimal initial planting density for perennial plant: Optimal initial planting density for perennial plant is the maximum initial planting density when the reduction of soil water resources equal or smaller than the waste land in one year. for example, in the semiarid region (Guyuan, China). The optimal initial planting density for caragana is 6500 [1,7].

Optimal initial planting density for one year plant, such as Pepper, the optimal initial planting density for pepper is 4000 plants/667m^2.

Figure 3: Author (right 2) show the estimating of appropriate initial plant density of pepper to the farmer in Xunhua, Qinghai, China.

How to cite this article: Zhongsheng G. The Methods of Agriculture High Quality Development. Agri Res & Tech: Open Access J: Open Access J. 2026; 29(5): 556465. DOI: 10.19080/ARTOAJ.2026.29.556465

Plant resources relationship regulation

If the resources in canopy crown, such as appropriate canopy [8] or suitable leaf amount, or root system, such as soil water resources in the maximum infiltration depth is smaller than space resources use limit by plants or resources use limit by plants, the Plant resources relationship enters the critical period of plant resource relationship regulation. If the plant density is more than the vegetation carrying capacity in the critical period of plant resource relationship regulation, we should regulate the plant resources relationship in critical period of plant resources relationship to obtain maximum yield and service. For economic species or crops, we should also regulate the relationship between vegetative growth and reproductive growth according to suitable leaf amount, the appropriate amounts of leaves when the plant density is equal to vegetation carrying capacity, and the relationship between the leaves and the number of fruits that meet the market demand to carry out sustainable use of resources and Agriculture high quality development (Figure 3).

Conclusion

Now, Development in China have entered new stage of high-quality development, agriculture high-quality development. The high-quality development of agriculture is to take some measures and methods to make the land produce the maximum output and services to meet people's yearning for a better life and the needs of agricultural production services. However, because overuse of fertilizer, overdose application pesticide and introduction of non-native plant species or varieties, initial planting density is too high more or too smaller than vegetation carrying capacity in the critical period of plant water relation regulation, exotic plant species or varieties changed the plant water relationship, which easily result in soil degradation and crop failure or waste of soil resources and are unfavorable for the sustainable utilization of soil resources and crops high-quality production. Therefore, it is necessary to estimate and take initial planting density and adjust the plant resources relationship and obtain the maximum yield and services to realize the sustainable utilization of soil water resources and crops high-quality management.

Because the cultivating period is different, some fruit tree can get maximum yield and beneficial for 4 to 5, we can select good plant species or varieties. For example, in the period from 1987 to 1991, from Japan, Shaanxi Fruit Tree Institute, Northwest Agricultural University and other units apple, pear, grape, peach, plum, walnut, date, mountain plant 9 kinds of 77 varieties were introduced in Shanghuang and Guojiawan (1990-1993) and other experimental orchards, compared and analysed and selected and bred excellent varieties of red plum apricot was selected and promote in 1995 and then large-scale promotion Shi & Guo [4]. If the plant density is more than the vegetation carrying capacity in the critical period of plant resource relationship regulation, we should regulate the plant resources relationship in critical period of plant resources relationship to obtain maximum yield and service. For economic species or crops, we should also regulate the relationship between vegetative growth and reproductive growth according to suitable leaf amount, the appropriate amounts of leaves when the plant density is equal to vegetation carrying capacity, and the relationship between the leaves and the number of fruits that meet the market demand to realize sustainable use of resources and Agriculture high quality development.

Acknowledgements

This project once supported by the National Science Foundation of China (Project No: 42077079,41271539 41071193) and Study on high quality sustainable development of soil and water conservation (A2180021002). We thank two anonymous reviewers for their helpful suggestions.

References

1. Guo ZS (2024) New Stage of Agriculture Development, Agriculture High-Quality Development. Journal of Food Technology & Nutrition Sciences.
2. Guo ZS (2025) Agriculture High Quality Development. J Biomed Sci Biotech Res 3(2): 1-5.
3. Guo ZS, Shi LM (1993) The mathematical analysis of the production's processes of fruit shoot. Chinese Journal of Biomass 8(3): 120-124.
4. Shi LM, Guo ZS (1995) Preliminary report of fruit tree introduction experiment in mountainous area of southern Ningxia. Ningxia Agriculture and Forestry Technology pp: 30-33.
5. Guo ZS (2025) "Innovation China" agricultural high-quality production industry service group, Chinese scientific and technological achievements.
6. Guo ZS (2025) Estimation Method of Suitable Initial Planting Density, J Plant Sci Crop Protec 8(1): 101.
7. Guo ZS (2025) Introduction and Selection of Fine Plant Species and Varieties. J Integrated Health 4(1): 356-358.
8. Guo ZS (2025) Appropriate Canopy Depth and Distance Among Plant. J Biomed Sci Biotech Res 3(3): 1-9.

How to cite this article: Zhongsheng G. The Methods of Agriculture High Quality Development. Agri Res & Tech: Open Access J: Open Access J. 2026; 29(5): 556465. DOI: 10.19080/ARTOAJ.2026.29.556465

This work is licensed under Creative Commons Attribution 4.0 License
DOI: 10.19080/ARTOAJ.2026.29.556465

Your next submission with Juniper Publishers will reach you the below assets

- Quality Editorial service
- Swift Peer Review
- Reprints availability
- E-prints Service
- Manuscript Podcast for convenient understanding
- Global attainment for your research
- Manuscript accessibility in different formats
  (Pdf, E-pub, Full Text, Audio)
- Unceasing customer service

Track the below URL for one-step submission
https://juniperpublishers.com/online-submission.php

How to cite this article: Zhongsheng G. The Methods of Agriculture High Quality Development. Agri Res & Tech: Open Access J: Open Access J. 2026; 29(5): 556465. DOI: 10.19080/ARTOAJ.2026.29.556465